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PEDIATRICS

By VARIOUS AUTHORS

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VOLUME I

With 284 Illustrations

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PREFACE

This system of pediatrics is a collection of monographic treatises on subjects of interest in the diseases of infancy and childhood. While there are many excellent text-books and monographs on the general and special subjects of children's diseases in the English language, the information here collected should be of value to the practitioner, student and teacher alike.

Preparations were made for the publication of these volumes early in 1914. Shortly after the authors had been selected and the assignments distributed, the Great War distracted the attention of the whole world from the works of peace, and every one's interest became absorbed in wartime measures. Very little progress with the publication was made during those fateful days and when, in 1917, America entered the war, the work was completely interrupted. Since the close of the war, however, the contributors have rallied to the support of the editor and publishers and have given unstintedly of their time and labor to bring the publication to successful completion. The earlier contributions have been revised and in some instances wholly rewritten to bring them up to date.

As may be observed from the short historical reference to encyclopedia publications which follows this introductory note, no extensive compilation of pediatric knowledge has been published since the appearance of Keating's "Encyclopedia on Children" which appeared in 1889. During the thirty-three fruitful years which have elapsed since the publication of Keating's epoch-making series of essays many changes and advances have occurred in medical knowledge; it has seemed timely and fitting, therefore, that a renewed attempt should be made to collect in monographic form the material which represents the fundamental knowledge of pediatrics. This I have attempted to do, and whatever labor it has cost, I feel I have been rewarded in the encouragement and coöperation of the distinguished workers who have assisted in making these volumes possible. Such a collection of essays should be of value not only because of the known facts which are presented but also because it will serve to indicate gaps in our knowledge and I have felt a satisfaction in the thought that the volumes would stimulate clinical and research work, especially by the younger men of English-speaking countries.

In addition to the discussion of the internal diseases of children, subjects of surgical interest have been introduced, because after all a child who is sick may require medical or surgical treatment or both, and a well-trained physician not only desires but is compelled to know when surgical treatment is indicated and the manner of its application.

The medical attendant may not himself be a trained surgical technician but it is important that he should recognize surgical conditions and seek surgical advice when it is required. Surgery of childhood differs somewhat from that of adults, since conditions arise in infants and young children which do not occur or which are rare in later life, and there are points of difference in surgical anatomy, surgical pathology, and surgical technic, as well as in surgical diagnosis, which are emphasized by the contributors to these books.

During the years which have passed since our work was begun, Drs. Mortimer Frank, Robert Krost and J. Louis Schwartz have been called by death before the completion of their contributions. Dr. Stanton Friedberg died shortly after he had contributed his manuscript on "Bronchoscopy and Esophagoscopy."

It was originally intended to include a number of chapters on orthopedic surgery but this has been undertaken under separate editorial management and it is proposed to publish these papers in a separate volume.

Finally I would express a deep sense of obligation and appreciation to the writers who have contributed these monographs. Those of us who know the arduous labors of the average medical man of today know best how much self-sacrifice and toil are entailed in the preparation of these papers. I desire to thank Messrs. W. B. Saunders and Company, the publishers, for their great helpfulness in every detail and their kindly spirit. I desire to make special mention for helpful suggestions received from Drs. Fielding H. Garrison, John Howland and Morris Fishbein. I am also indebted to Dr. William J. Corcoran who has rendered valuable aid in arranging the manuscript and in the reading of proof; and to Drs. Johanna Heumann, I. H. Tumpeer and Alice Williams who have assisted in various ways.

Isaac A. Abt.

Chicago, Ill.

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CHAPTER XI

ENCYCLOPEDIAS WHICH REFER TO THE DISEASES OF CHILDREN. AN INTRODUCTORY ESSAY

By Isaac A. Abt, M.D.,

Chicago, Ill.

Although the name encyclopedia was not applied until the 16th century it is recalled that composite books containing all the knowledge of the period were published as early as that of Hwang-ti (2698–2599 B.C.) This Chinese Emperor and philosopher promulgated, in a system of internal medicine, a peculiar doctrine which gave personality to the intimate relations of the human organs. Of the Egyptian papyri, that of Ebers, about 1553 B.C., is most complete in its recipes and directions for the treatment of various diseases, and that of Smith, about 3000 B.C., recently translated, is most important for its age and for its rationality. It is hardly necessary to describe completely these works of which so much has been written; and this is also true of the medicine of the Bible and the Talmud. These extensive compilations of religious thought with rules for hygienic conduct are especially noteworthy in the attention paid to the care of the mother and the hygiene of the newborn.

ORIENTAL MEDICINE

Ethnologists know that with the development of every race and nation medicine and the healing art assume a conspicuous place in the life of the community. It is not surprising to find that even among the writings of the ancient Indians, such as the Veda and other sacred books, portions by the two physicians, Charaka and Susruta, 1000 B.C., had an important place. The frequent application of cold water, a rational hydrotherapy, and fantastic charms, incantations and extraordinary superstitions associated, for example, with the color of drugs, mark the medical literature of this epoch.

GREEK AND ROMAN MEDICINE

The Hippocratic collection of writings, as pointed out by Neuburger comprises an intersection of all previous tendencies in medicine, united as an interwoven thread, stretching backward into antiquity and forward to the present day. Whether the work of Hippocrates, a single genius, or the motley heterogeneous output of generations, this notable collection must be considered as representing the inspiration of a master.

Following the Hippocratic writings by some 300 years are the works of Celsus and the collections of Pliny, the former basing his writings on the collection of Hippocrates and including also the medicine of the Semitic peoples, the latter presenting more or less loosely combined facts. In Pliny's writings the original references to scurvy, superfetation and atavism are especially noteworthy for the disturbances of infancy. Equally interesting, moreover are the satirical shafts of wit aimed at the physician which also characterize the writings of other philosophers of the period.

Soranus of Ephesus, 100 A.D., was a prolific writer. Of his numerous manuscripts those on the care of the newborn, the nutrition of the infant, the selection of the wet nurse, and on gynecology and obstetrics are of importance as references to the early literature on pediatrics. In fact, Sudhoff has said of him, "What Celsus' work signified for medicine and surgery, this work of Soranus signified for gynecology, obstetrics and pediatrics in the ancient literature."

The outstanding treatises of the medicine of the middle ages are based on the important works of Galen who commenced practice in Rome about 164 A.D. His compilations were extensive and his therapeutics notable for their dogmatism. While the names Celsus and Galen may be familiar, Oribasius, Paul of Ægina, and Ætius of Amida are not so well known, although each is credited with a great encyclopedia of the medical knowledge of his day. Oribasius was one of the last of the Alexandrian school. His larger work was too bulky for general use, so he wrote a summary or synopsis which was said to have been for the use of his son. This synopsis continued for a long time to be the source for medical information for physicians of the Byzantine and Middle Ages. It has been thought that by writing the synopsis he distracted attention from the ampler work. The writings of Oribasius, Paul of Ægina and Ætius have been made the subject of an essay on plagiarism by Sir Clifford Allbutt, and yet the ability to choose with judgment is in itself a fine art.

ARABIAN MEDICINE

In the Fitzgerald lectures recently delivered by Sir William Browne, an erudite and beautiful exposition of Arabian medicine, mention is made of a work of medicine and natural philosophy written about 850 B.C., to which Ali-ibn-Ribban, the author, gave the modest title "Paradise of Wisdom." The fame of the Arabian scientist rests not so much on this work, however, as on the fact that he was one of the teachers of the great physician Rhazes. The latter, most important among Moslem physicians, wrote an extensive treatise, particularly noteworthy for its citation of case histories, which is a classic in early Arabian medicine. In Persia 100 years later appeared the prince of physicians, Avicenna. He has been well called the Galen of the Arabs for he was a voluminous writer of a systematic type of mind. The Canon of Avicenna became the most important text in the Moslem

world and superseded the works of Rhazes and other earlier writers. From the twelfth to the seventeenth centuries it continued to be the guide of medical students in European universities and Avicenna became more famous than Rhazes. Up to about 1650 the Canon was still used as a text-book in the universities of Louvain and Montpellier.

SCHOOL OF SALERNO

During the Middle Ages, from the sixth century onward, all medical activities were gradually circumscribed by the church, especially by the monks who were well educated and who were able to read not only their own but also foreign languages. The two chief literary works of the school of Salerno, which dominated medicine during the next half century, are the "Compendium Salernitatum" and the "Regimen Sanitas." The "Compendium" is the first example of a complete text-book of medicine and surgery in which many experts work under the direction of a single editor. Many subjects were considered including venesection, the pulse, the urine and fever all of which were on Hippocratic principles. The "Regimen Sanitas" was a medical poem. Verse-making in medicine became a genuine medieval fashion among Christian writers of this period. The object often was to facilitate committing the subject to memory. The "Regimen Sanitas" was undoubtedly a composite work, various editions being made from time to time.

Up to the 16th century, therefore, while the actual knowledge of medicine as a science developed but little there were gradually being accumulated a vast amount of empirical observations and data and attempts to interpret natural phenomena and the causes and nature of human diseases in terms which would convey such knowledge to future generations. Knowing nothing of the circulation of the blood, the physician was compelled to account in a vague and indefinite manner for the phenomena related to the circulation. The limitation placed on the acquiring of the fundamental knowledge of anatomy, physiology, and other basic sciences permitted only limited observations and stimulated speculative philosophy.

Each encyclopedist of this early period borrowed liberally from his predecessors and added thereto the small amount of observation and a larger amount of original philosophy which represented his own contribution. Even the men of genius plundered largely. Among the summists and copyists of Byzantium such natural masters as Soranus and Galen plundered largely, literally and anonymously. The Arabs transcribed the Greeks, the Greeks the Latins, and the Latins each other. Allbutt suggests that Celsus may have named his sources so generously because he was a layman. Pliny helped himself lavishly to Dioscorides but makes no acknowledgments to him.

With the natural intermingling of nations resulting from commerce and warfare the writings of physicians of one nation were liberally transferred into the literature of other nations. Medical

plagiarism is not an innovation of modern times. Perhaps the word "plagiarism" is harsh, for after all no man can in his own life time accumulate sufficient experience to write a complete exposition of even a single group of diseases. It is the mark of rationality and progress to benefit by the experiences of the past.

THE SIXTEENTH CENTURY

Collective writings in the modern sense did not appear until about the sixteenth century, when a huge "gynecia" or encyclopedia of gynecology was issued by Caspar Wolf (1532–1601) of Zurich, in 1566. This was later enlarged by Caspar Bauhin (1550–1624) of Basel, in 1586. These two compilations of the best that has been written on the subject were afterward reprinted in one volume by Israel Spach, of Strassburg, in 1597. Encyclopedic treatises on medicine by many authors, not unlike the works written on the cooperative plan in our own time, were a special feature of the medicine of the Renaissance and of these we may mention, in addition to the Basel encyclopedias of gynecology, the Aldine "Medici Antiqui Omnes" (1547), the "Medicæ Artis Principes" of Stephanus (1567), the Venetian anthology of mineral waters, "De Balneis" (1553), the Gesner collection of surgical treatises (Zurich, 1555) and the medical dictionaries of Symphorien Champier (1506), Lorenz Phryesen (1519), Henri Estienne or Stephanus (1564) and Jean de Gorris or Gorræus (1564). With these may be classed the concordance of expressions from Erotian by Eustachius (1566), the "Variæ Lectiones" (1571) of Geronimo Mercuriali and the "Œconomia Hippocratis," a similar exegesis by Anutius Fœsius (1588).

THE SEVENTEENTH CENTURY

In the seventeenth century various encyclopedic works were compiled. In 1677 J. J. Hoffmann published in Basel his "Lexicon Universale." This was more in the nature of a dictionary, in the modern sense, though it gave a summary of the most important facts of the arts and sciences as they were understood at that time.

Among other works of this period were the "Biblioteca Universale" of Coronelli. It was to have appeared in thirty-five volumes, though only seven were published (Venice, 1701–1706).

A German encyclopedia, which appeared during this period, was a complete collection and was named after one Zedler, the publisher who produced the work. It was entitled "Grosses vollständiges Universal Lexicon aller Wissenschaften und Künste."

Other books of this period which were dictionary compilations were Hübner's "Konversationslexika" (1704), and the work of Brockhaus (1796–1808), the encyclopedias of Ephraim Chambers (1728), Diderot (1751–1752), Voltaire's, "Dictionnaire philosophique," 1784 and the "Encyclopedia Britannica" (1768–1771).

The "Encyclopedia Britannica," in three volumes, was completed by a society of gentlemen in Scotland in 1771.

No work of reference has been more useful and successful or more frequently copied, imitated and translated, than that known as the "Konversationslexikon" of Brockhaus. It was begun in 1796–1801 by D. Gotthelf Renatus Löbel.

Diderot published his "Dictionnaire universal de medicine" in six volumes in Paris, 1746–1748. This publication was a translation of the celebrated "Medical Dictionary" of Dr. Robert James, inventor of fever powders (London, 1743–1745). It consisted of three volumes, 3257 pages and 98 plates, comprising a history of drugs, chemistry, botany and natural history so far as they relate to medicine, and contained a historical preface of 99 pages.

THE WORK OF TOBIAS

Levinson recently abstracted the work of Tobias which belongs to the latter part of the seventeenth and the early part of the eighteenth centuries. References are quoted here liberally because they indicate the nature of the encyclopedic writings of the period. Tobias was a wandering practitioner of medicine who studied in different countries. He began his study of medicine at Krakow, continued his course at Frankfort, obtained his degree at Padua, practiced in Poland, was attending physician to five sultans, wrote his book in Adrianople, published it in Venice, held a professorship in Constantinople, and died and was buried in Jerusalem. His *wanderlust* brought him into contact with the greatest authorities of his age and enabled him to study the diseases of the different countries in their nativity. He was thoroughly conversant in nine languages; he knew their daily usage, their literature, and their science.

The close of the sixteenth and the beginning of the seventeenth centuries were crowded with events in the field of science in general, and of medicine in particular. Not many years before the birth of Tobias Lord Bacon promulgated the inductive method of philosophy which exerted a profound effect on religious and philosophic thought throughout the entire world, and Copernicus announced the view of the solar system that moved the earth from its place. It was in the sixteenth century that Vesalius dissected human bodies and thereby put anatomy on a scientific basis, and in the early part of the seventeenth century Harvey enriched the world with his discovery of the blood circulation.

During these years Tobias worked indefatigably on a variety of medical problems. The results of his labors were compiled in his most representative book, "Maaseh Tuviah." The book is encyclopedic in nature. It contains thoughts on religion, something of astronomy, geology, chemistry, and indeed a little of everything, but the major part of its contents is devoted to medicine. Such was the popular way of writing in his day, and indeed, books such as his served a very useful purpose. They furnished a mirror of the views of the author and of

his contemporaries not only on the main subject of the treatise, but on every other human project that enlisted the interest of thinking men. It would be interesting to follow Tobias through his many by-paths, were we not especially concerned with his contributions to medical literature. (Levinson, "Medical Cyclopedists of the Seventeenth Century.")

Encyclopedias in the modern sense originated in England. France soon followed although her publications were written in a more philosophic spirit. In Germany, during the last century, publications almost too numerous to mention have been issued in which treatises on every possible subject were collected and treated in detail. These works were encyclopedic in that they were compilations of various subjects discussed by numerous authors. In 1834 publication of Schmitt's "Jahrbücher" was commenced and they have continued for many years to furnish abstracts and important bibliography.

SYSTEMS OF MEDICINE

Among the most important of the general medical systems is that of v. Ziemssen. The first volume was published in 1876. In this collection the whole field of internal medicine and infectious diseases was covered in a masterful way. Many of the monographs emanated from the medical leaders of the time, such as Liebermeister, Curschmann, Oertel, Schrötter, Naunyn, v. Ziemssen, Steiner, Steffen, Fraentzel, Jürgensen, Rindfleisch, Quincke, Zenker, Kussmaul, Erb, Senator, Birch-Hirschfeld and a host of others. This system was the classical reference book for several decades, and while the material advances in clinical medicine, pathology and physiological chemistry have rendered these volumes obsolete, nevertheless the clinical observations and the descriptions of disease would in many instances be valuable as reference for the modern student of medicine. The authors who contributed to this series were masters in the art of clinical medicine.

The Nothnagel "System," which is a very large aggregation of volumes, covers similar material to that of v. Ziemssen's, though in a more modern period. The monographs are in most instances classical contributions and continue to be of value to the present-day student and investigator.

Another system, less voluminous, is that of Ebstein and Schwalbe. More recently the "Handbuch der innere Medezin" by Mohr and Staehlin has been compiled, and still more recently that of Friedrich Kraus and Theodor Brugsch.

The unique publication by Lubarsch and Ostertag on "Ergebnisse der allgemeinen Pathologie des Menschen und der Thiere" is a collection of volumes published annually, reviewing in a most comprehensive manner the additions to pathologic knowledge and constituting a valuable book of reference. Penzoldt and Stintzing compiled a system of therapeutics in 1894.

AMERICAN AND ENGLISH SYSTEMS OF MEDICINE

In America a system of practical medicine was edited in 1885 by William Pepper, assisted by Louis Starr, and in 1907 Osler's "Modern Medicine," by American and foreign authors, was published. The latter contained many papers of striking merit and has served as an important reference work for students, teachers and practitioners. In addition, numerous encyclopedic publications on surgery and other branches of medicine have been published in America.

Allbutt's "System of Medicine," an English publication which appeared in 1896, contains papers by English and American authors. It is one of the most valuable of the modern English encyclopedias. The "Twentieth Century Practice of Medicine" was edited by Thomas L. Stedman of New York. It consists of 20 volumes and contains many interesting and valuable contributions. Among other encyclopedic books published during the last two decades may be mentioned the "Reference Handbook of Medical Sciences," the first edition of which appeared in 1885–1893, the third edition in 1913; systems of therapeutics edited by Hare in 1891, Solis-Cohen in 1902, Musser and Kelly, 1911–1917, and Forchheimer in 1906. Barker's monographs on internal medicine appeared in 1916, and the "Encyklopädische Jahrbücher der Gesamten Heilkunde," edited by A. Eulenburg in 1907.

SYSTEMS OF PEDIATRICS

In pediatrics the number of extensive compilations is not large. About 1773 in Leipzig a collection of interesting treatises was published which gave in detail some of the clinical disorders of infancy and childhood. This publication consisted, however, of a series of papers containing clinical descriptions. In 1811 a series of essays appeared in France entitled, "La Clinique des Hôpitaux des Enfants et Revue Retrospective Medico-Chirurgicale et Hygienique; publices sous les auspices et par les medicine et chirurgiens des hôpitaux consacrees and maladies des enfants."

Among the outstanding systems are Gerhardt's "Handbuch der Kinderkrankheiten," 1877–1893; John M. Keating's "Cyclopedia of the Diseases of Children," 1889–1890; J. Grancher and J. Comby's "Traite des Maladies des Enfants," 1897; Pfaundler and Schlossmann's "Handbuch der Kinderheilkunde," 1906; Anderodias and Cruchet's "La Pratique des Maladies des Enfants," 1909. Gerhardt's Handbuch was an epoch-making publication which collected the most important information on the subject and for many years stimulated study and research. Henning's contribution in this publication was eagerly read by the specialist and consulted by those who desired information on the history and development of the pathology of childhood. Henke's dissertation on the anatomy of childhood has long been considered a classic. Vierordt wrote on physiology, contributing 288 pages of the most carefully assembled facts; this chapter

is an important source of physiologic knowledge concerning the child. To A. Jacobi was assigned the hygiene of infants and children, and the subject was most carefully and thoughtfully treated. C. Binz wrote on therapeutics and Pfeiffer on infant mortality. In the same volume Pfeiffer wrote on vaccination and A. Baginsky on school hygiene. Rauchfuss of St. Petersburg considered hospital buildings, hospital administration and equipment, and he also contributed a chapter on congenital heart disease.

It is not necessary to give in detail all of the subjects considered, but perhaps one of the most important papers was that of Widerhofer and Kundrat on the gastro-intestinal diseases of infancy. Many new theories have arisen since that time. New information in chemistry and pathology has been added to this group of disorders, and the classification proposed by Widerhofer has been changed time and again, but the keen clinical observations, and the carefully expressed descriptions have remained as a basis for all subsequent discussion of this disease group. The Gerhardt "Handbuch," a pioneer in modern pediatric writings, has been a real force in developing the study of pathology in infants and children.

Keating's "Encyclopedia" was published in 1889 in four volumes and ten years later a supplement appeared. An array of the most distinguished pediatric teachers and thinkers in America contributed to this work. A. Jacobi wrote the introduction, James Finlayson, of Glasgow, made a valuable contribution on diagnosis, Thomas M. Rotch, of Boston, wrote the chapter on infant feeding, W. B. Cheadle, of London, discussed rheumatism and acute and chronic endocarditis, Thomas Barlow described rickets and scurvy, William Osler contributed the chapter on congenital heart affections, L. Emmett Holt discussed diarrheal disorders, acute and chronic, and J. P. Crozer Griffith described diseases of the blood and the blood-making apparatus. The other distinguished men who wrote for this book typify the most advanced thought on their special subjects. The volumes had an important and stimulating influence on English-speaking physicians, and served to call attention to the entire field of pediatrics by presenting knowledge in a readily accessible form. The work awakened a keen interest in the pathology of childhood and Keating's treatise was, for many years, the standard reference book for the specialist in pediatrics as well as for the general practitioner in medicine.

The Pfaundler and Schlossmann system, published in German, has been translated into English. The first volume contains a paper by Franz Hamburger, of Vienna, on general pathogenesis and pathology of childhood and deals with the general aspects of disease. A very interesting and painstaking chapter is that of Professor M. Pfaundler, now of Munich, on the symptomatology of children's diseases. He sets forth in a very elaborate tabular form the symptoms which may occur in the various diseases.

The contributions of G. Bendix on general prophylaxis, H. Neu-

mann on therapeutics and of Prausnitz on mortality and morbidity are worthy of careful study. Following this are valuable papers by Raudnitz on milk, two papers by Camerer, one on metabolism and nutrition during the first year of life, and another on children's growth in weight and height. The contributors constitute the leading authorities in Germany and Austria and, while these volumes were published sixteen years ago, they still constitute an authoritative reference work. Supplementary volumes have been published, one on surgery and orthopedics and another on nervous diseases, and one on the eye and ear and speech disturbances.

SPECIAL WORKS OF PEDIATRIC INTEREST

In 1905 "Die Deutsche Klinik" included a series of essays on diseases of children on selected topics. Among many contributors of distinction Czerny wrote on the feeding of children, Monti on the most frequent infections of the buccal mucous membrane, Soltmann on scrofulosis and tuberculosis of children, Escherich on acute digestive disturbances of infants, C. Keller on disease of the newborn, and Heubner on measles.

In 1913 appeared the first volume of a book entitled "Handbuch der allgemeinen Pathologie und der pathologischen Anatomie des Kindesalters," edited by Brüning and Schwalbe, both of Rostock; the book considers the pathology of infants and children and also discusses at considerable length the various malformations. In a special chapter the subject of comparative pathology is treated in which the diseases of young animals are compared with those of young children. The infectious and parasitic invasion of young animals, as well as the malformations and the tumors, are discussed. Nearly every tissue and organ is studied in this way by Jost and Koch. Publication of this work was interrupted by the war and at present (1922) it is not complete.

A composite volume on "Diseases of the Nervous System" by Bruns, Cramer and Ziehen, which appeared in 1913, contains detailed descriptions of the various nervous and mental diseases incident to infancy and childhood. It is undoubtedly one of the best reference books of its kind.

A very valuable book on the hygiene of the child was issued by W. Kruse and Paul Selter in 1914. This work considers growth and development, cause of disease, infantile nutrition, protection against heat and cold, and hygiene of the environment. Another chapter deals with exercise of the body and mind, hygiene of infancy, school hygiene, hygiene of crippled children, training of defective and nervous children and a variety of other subjects. The treatise is a valuable collection of monographs for those who are especially interested in the hygiene and diseases of infancy and childhood.

The "American Text-book of Diseases of Children" published in 1898 under the editorial management of Louis Starr of Philadelphia,

contains valuable contributions by American authors of note. H. Dwight Chapin wrote the chapter on hereditary syphilis. There are excellent chapters on infectious and digestive diseases. Victor Vaughan, in a notable contribution on the diarrheal diseases, was undoubtedly one of the earliest writers who considered that the gastro-intestinal diseases of infancy may be caused by food disturbances. The late Sir William Osler wrote the chapter on tuberculosis in infancy, and his paper was one of the best on the subject accessible to English readers at that time. The chapters on nervous diseases in children were carefully considered, notably the papers of Frederick Peterson, Charles K. Mills, Allan Starr and other distinguished authors.

A composite book entitled the "Practice of Pediatrics," edited by Walter Lester Carr, was published in 1906. It contains many important contributions and in addition to the American authors, papers from several eminent English clinicians are presented.

A unique collection of books entitled "Collectanea Jacobi" in eight volumes was edited by William J. Robinson. These volumes contain the various publications of the distinguished pediatrician, his medical essays, his public addresses and his discussion of public problems. These papers teem with medical wisdom, philosophic thought and an unusual human understanding.

An English book on "Diseases of Children" by various authors, edited by Garrod, Batten and Thursfield, contains a splendid series of contributions with excellent clinical descriptions of the most commonly encountered diseases of children.

Feer's recent work, "Lehrbuch der Kinderheilkunde," published in 1911, is a composite book and up to the present time has gone through seven editions. The contributors are among the most active and best known German pediatricians. Finkelstein, Ludwig Meyer, Pfaundler, von Pirquet, Noeggerath, Ibrahim and Moro contribute the various chapters.

Kelynack in 1908 published a book on "Tuberculosis in Infancy and Childhood" by numerous English and some American authors. It is a brief treatise covering about 350 pages. The same author has edited a book on medical examinations of schools and scholars with the collaboration of a number of British writers, though there are some foreign contributors who detail school examinations as carried on in their own countries. The edition contains contributions from Switzerland, Sweden, Norway, Denmark, France, Germany and several from leading authorities in the United States.

The book by Grancher, Comby and Marfan, consisting of five volumes, covers the general field of pediatrics and includes contributions by a brilliant array of French and foreign scholars. Ballantyne of Edinburgh, Barlow of London, Bokay of Budapest, Epstein and Fischel of Prague, and Escherich of Vienna, are among the contributors.

"La Pratique des Maladies des Enfants," edited by Apert, Cruchet and Carriere, is a comprehensive system of pediatrics by leading French clinicians. It was published in five volumes in 1912 by J. B. Balliere.

CONCLUSION

In attempting to make a rapid survey of the encyclopedic literature covering a vast period of time it has been possible to mention only the outstanding collections. To do full justice to any of them would require more detailed accounts and descriptions of greater length. It has been my purpose to give a brief survey of the rise, existence and development of this kind of literature as well as to consider its influence on medical thought and medical progress.

For ages medicine was in a chaotic state; such science as existed was almost hopelessly mixed with empirical deduction and inference, unchecked by rational methods of control. A glance down the centuries from the time of Hippocrates, the first real physician to conceive the idea of bringing together the collected wisdom of the preceding ages, reveals many encyclopedic volumes which influenced the progress of contemporary physicians and stimulated succeeding generations toward greater achievement.

The outstanding lesson to be learned from such a historical review is the fact that preeminent thinkers and leaders—men of real genius, do not appear frequently. Hippocrates had many eminent disciples, yet for many centuries no great discovery was made and no new light was shed on medical problems. Not until the 16th century did the scientific spirit of experiment, observation and investigation permit medicine to emerge from the darkness. The development of physiology, anatomy, pathology and eventually of chemistry lifted the healing art out of the abyss of ignorance, philosophic speculation and uncertainty and placed it on firm ground which permitted progressive and rational development.

Great geniuses—leaders and pathfinders—are few and far between. They cannot be manufactured by pedagogic methods, either ancient or modern. They are not the product of any system of education; they are born great and remain so, and their light and lustre illuminate the field by revealing hidden facts and by uncovering what has seemed impenetrable. It falls to lesser mortals to give such aid and encouragement as they can.

A SYSTEM OF PEDIATRICS

CHAPTER I

HISTORY OF PEDIATRICS

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Pediatrics as a specialized branch of medicine had no real existence before the middle of the nineteenth century, hence the literature of the history of the subject is meager. Its earlier history is only a small part of the main current of internal medicine.

Carl Hennig's introductory chapter in the Gerhardt *Handbuch* (1879, I, 11–50), the unsatisfactory fragment by Wolf Becker in the Puschmann *Handbuch* (1905, III, 992–1000), the admirable addresses of Theodor Escherich and Abraham Jacobi at the St. Louis International Congress (1905), the charming history of infantile hygiene by Auvard and Pingat (1889), S. S. Adams' study of American pediatric literature (1897), Hermann Brüning's illustrated history of artificial nutrition of infants (1908) and his historical review of pediatrics (with an excellent bibliography) in Brüning and Schwalbe's *Handbuch* (1912, I, 1–20), Ludwig Unger's translation of Metlinger (1904), the studies of Greek pediatrics by T. Kroner (1876–7) and J. W. Troitzky (1900), Sudhoff's investigation of Cornelius Roëlants (1909–15), Forsyth's history of infant feeding from Elizabethan times (1910), Abt's history of the classification of gastro-intestinal diseases (1912), Jacobi's history of American pediatrics (1913), L. E. Holt's history of infantile mortality (1913) and Jacobi's subsequent papers on pediatrics in New York City (1917) make up almost the entire literature of any importance. An indispensable bibliography of pediatrics (up to 1849) was published by F. L. Meissner in 1850. The full literature of the subject, up to 1898, is listed in the Index Catalogue of the Surgeon General's Library under the headings "Children" and subdivisions (II, 936–957; 2. series, III, 422–472); "Infant (New-born)" and "Infants" (VI, 821–860; 2. series, VII, 891–930); and "Pediatrics" (2d series, XII, 717).

In the present study I shall endeavor to outline the subject from the viewpoint of the general historian and bibliographer rather than that of the professional pediatrician, but I shall neglect the customary procedure of attempting to embrace the whole history of medicine in a narrative of this kind. There are many things in the secular and cultural history of races and nations which are of great moment in the history of pediatrics. But it is reasonable to suppose that any well equipped practitioner or specialist of today is acquainted with the general trend of the history of medicine, and my own experience tells me that it will only impede his progress to pester him with irrelevant data about the past. Biographical details about earlier physicians, whose relation to pediatrics was only oblique or incidental, will not be given and will be otherwise confined to men who have devoted their lives to the subject.

* Published by permission of the Surgeon General, U. S. Army.

Hennig has remarked that the science of children's diseases is the last and latest addition to the science of disease in general. For this strange phenomenon he assigns two causes: First the intimate relation existing between mother and child at the start, making obstetrics, gynecology and pediatrics inseparable; second, the difficulties encountered in recognizing diseases in speechless young children or in eliciting clinical information from them before the days of expert precision in diagnosis and autopsy.* This is a common excuse of all the earlier pediatricians, from Walter Harris down. The Swedish bills of mortality, even as late as Rosenstein's day, listed 9,783 children as dead "from unknown causes." But a far more potent factor was also operative, namely the absolute neglect of the proper care and hygiene of infants among savage and primitive peoples everywhere, and even among highly civilized peoples in the immediate past. Few realize, indeed, that it was a main object of the Greeks, Romans, Arabians and some later peoples to destroy rather than to save a majority of newborn infants, partly for economic reasons, partly from inherent selfishness. It is literally true that, among primitive races (in space) and ancient peoples (in time), the newborn child was often predestined to be murdered. Among modern "civilized"peoples, for a long period, the child, if of poor or humble parentage, was predestined to be maltreated, starved and tortured. To appreciate this fact, let us glance at the **ethnic and social status of the child** in space and time. In all prehistoric and primitive phases of human development, the child is regarded as a negligible factor. In primitive society, the struggle for existence obtains in full force; the individual is sternly sacrificed for the welfare of the tribe or race; the strong wear down the weak; the weakest inevitably go to the wall. Blind forces flow, as in physics, from higher to lower potentials. The infant, being the weakest configuration of human protoplasm conceivable, stood, as Payne says, "naturally low in the scale of value."† Among primitives, infanticide, abortion, cannibalism and ritual sacrificing of children are the rule; solicitude for their preservation is the exception. Savage children are mutilated by tattooing, scarification of the face and body, artificial deformation of the skull, the face or the extremities, and ritual operation upon the genitals. Twins are frequently killed as something unnatural or uncanny, or upon the supposition that one of them is a sort of monstrous superfetation from adulterous intercourse. Children born on "unlucky days" are slaughtered, as also children born headfirst or in footlings presentation, children born with teeth, a caul or other abnormities, children born in stormy weather, children that sneeze directly after birth; in fact, almost any pretext for infanticide is seized upon, in particular the crude Malthusian notion of limiting

* C. Hennig, Handbuch der Kinderkrankheiten (Gerhardt), Tübingen, I (1877), pp. 1–2.

† G. H. Payne, "The Child in Human Progress." N. Y. (1916), p. 5. This book, while somewhat one-sided in its enlargement upon the cruelties practised upon children through the ages, is still a very valuable summary.

the population by sacrificing all children born in excess of a statutory number for a given family. The "pigeon pair" (*das Zweikindersystem*) is as popular with the savage as with the *civilisé* of today. It has been shown that prolificity varies with the amount of food-supply and the productive value of offspring. Limitation of offspring is usually determined by scarcity of food and creature comforts, but religious ardor, alleged solicitude for the welfare of the race, anxiety lest the child suffer as a charge upon the community, economic reasoning, have been in each case a cloak for cruelty and murderous feeling in the savage as in the civilized. The only protection the child has in the savage state originates in maternal feeling, and the mother is invariably subjected to the male. Prosper Mérimée observed that "*La femme à l'état sauvage est toujours laide.*" How much more is this true of the savage child. The distrustful, sometimes hostile faces that look out from the pages of Ploss's "*Das Kind*" tell their own tale. Girls had invariably a harder fate than boys. The story of the routine sacrifice of female infants is one of the saddest pages in human history. Even among the Greeks and the Romans, the murder of children and the glorification of the male element, to the exclusion of every thing else, localizes and diagnoses a latent barbarity. Plato said that the *fœtus in utero* was to be regarded as an animal. Plutarch declared the destruction of one's own children to be ofttimes a great and virtuous action. It is significant that Egypt and Babylon, the two ancient civilizations which were kindest to children, were of the matriarchal type.

The charms and taboo practices employed to ward off evil spirits from the unborn child, such as the couvade, probably originated, not from parental sympathy, but from the savage's innate fear of intangible evils and of the unknowable. Tekonymy, the re-naming of a parent after his newborn offspring, does not spring from regard for the offspring but from the inflation of parental self-esteem upon possessing offspring. The various mutilations of the child's body*—boring holes in the nose, lips and ears, flattening the nose, deforming the skull, feet and fingers, knocking out or sharpening the teeth, circumcision, clitoridectomy, infibulation, tattooing, scarification—are superstitious rites, initiating the sexual life, preparatory to marriage, or even regarded as improving the child's appearance. All are animistic in theory, but hardly expressive of human sympathy. The casting of horoscopes for the child, the hanging or secreting of amulets about its person, the planting of trees in its favor, and similar rites, have the same tendency and significance.† Lane (Modern Egyptians) records that well-to-do women of Egypt dress their children poorly and shabbily "to guard them from the evil eye."

* On the subject of artificial deformation and mutilation of children among savage and civilized peoples, see J. H. Porter, Ann. Rep. Smithson. Inst. (1887), Washington, II (1889), pp. 213–235; and A. Chéreau, Mutilations ethniques, Dict. encycl. d. sc. méd. (Dechambre), Paris, 1876, 2, s., xi, pp. 153–167.

† See H. Ploss, "Das Kind, 3 Aufl." Leipzig 1911–12, 2 v., *passim;* and Elsie Clews Parsons, The Family. N. Y., 1906, pp. 95–111.

"The attitude of the tribe or nation towards its young," says Payne, "is also a barometer of progress." At the beginning of his book on "The Child," he points out that the lowest human tribes are less human in sentiment for their women and their offspring "than certain beasts and birds." "The instincts of the lower animals," said Darwin, "are never so perverted as to lead them to regularly destroy their own offspring or to be quite devoid of jealousy." The normal causes of **infanticide among savages** are either superstition or fear of famine. The Papuan family is restricted to two children. Infanticide is very prevalent in the coral-reef islands of Polynesia, where the food supply is always an uncertain quantity. Twins are immediately killed among the South Australians, Aruntas, the Kaffirs and the West African negroes. It is dishonorable for women to have twins in the Benin territory, whence twin-bearing women are roughly handled. In more specialized communities, children are sacrificed as an offering to the gods. Here religion becomes a kind of sanctioned blackmail of humans by gods and their organized votaries, or else a cloak for fanatical self-exploitation or some equally selfish end. The real reason is that there is not enough food to go around. To nomadic tribes, indeed to all whose principle of action is Kipling's "He travels fastest who travels alone," children are invariably an encumbrance. In old and (up to recent times) almost stationary civilizations, such as China, India and Japan, infanticide, the routine sacrifice of female children and the selling of children into slavery were consequent upon the deposal of the primordial matriarchate, and grew with increasing density of the population or latterly with occasional periods of famine and privation. In China, the drowning of infants, especially female infants, is still prevalent in spite of endless imperial edicts. The Jesuits record that up to 232 B.C., children were an asset, the orphan could choose his adoptive parents and there was no trace of drowning, exposure or abandonment. With Confucius arose the idea of male sovereignty, with the child as a subject or chattel. Under Tsin Chi Hoang (232 B.C.), war and famine led to the practice of abandonment and to the drowning of female infants. In the first official document against infanticide (1659), an edict of Choen Tche (1633–62), we read:

> I have heard that the sad cry uttered by these girl babies as they are plunged into a vase of water and drowned is inexpressible. Alas! that the heart of a father or mother should be so cruel.*

Subsequent decrees of 1773, 1815, 1845, and 1848 proved of little avail, owing to the scarcity of food in relation to the density of the population. Some writers estimate that from 25 to 40 per cent. of female infants are drowned annually but the practice is slowly dying out in most localities. In ancient Japan, the sons of a polygamous father were natural enemies and had no claim upon him. Human sacrifice, *e.g.*, to insure that the foundations of a building might be

* Cited by Payne.

"well and truly laid," was abolished about 3 B.C., but famine sometimes produced cannibalism, and children were legally punished as scapegoats for the crimes of their parents up to the end of the seventeenth century. Chinese ideas and ideals gained ascendency about 552 A.D., and after Confucius came the deposal of the matriarchate by the Samurai and the sacrifice of children to the welfare of their parents. There were eight enactments against the sale of children between 1624 and 1734. The Japanese are fond of children and have no such intense dislike for girls as the Chinese, nor is the population so dense, yet many children were sold during the famine of 1905 and infanticide is said to have been prevalent in connection with the high taxes following the Russo-Japanese War. In ancient India, the Aryans, originally an agricultural people, later a race of fanatical warriors, desired male children to increase the fighting capacity of the tribe. Male children became part of the scheme of wealth. Females were preserved for procreative purposes only. The Laws of Manu declare that "Women are born to bear children." The slaughter of unnecessary children was sanctified in the Mahabharata. The ancient rituals show that female children were doomed at birth. Female infanticide was held to be of divine origin; the real reason for its existence was economic. The chief end of Aryan man being to feed himself by predatory wars and to breed soldiers for this end, women were only tolerated in numbers sufficient for this purpose. Female infanticide, like the suttee custom, was highly prevalent in eighteenth century India. The attempt of Colonel Alexander Walker to suppress it, in 1805, led to a long correspondence of 80 years duration, in which the Indian princes protested vigorously against interference with their religious and social ideas of 4900 years standing. The Infanticide Act of 1871 was the final effort of government to suppress the practice. The ancient practice of sacrificing the first born for ritual reasons is familiar in the Biblical stories of Abraham and Isaac and the daughter of Jephthah. The Arabians, a nomadic desert people, sacrificed their infant and even adult daughters by burying them alive, until the practice was suppressed by Mohammed. The Greeks, in some respects the most intelligent people the world has known, were utterly callous about the fate of children foredoomed to exposure by economic conditions or by the shame of pregnancy in unmarried women.

But there is a good deal of human nature in the world and we must not neglect the brighter side of the picture. The civilizations of Egypt and Babylon, being centered in fertile, plenteous lands, and matriarchal in type, were as we shall see, reasonably fair and decent to the child. This was perhaps also true of the Minoan civilization of Crete, the presiding deity of which was a primordial mother-goddess. There is sufficient evidence that such children as were permitted to survive under stress of economic conditions were not inhumanly treated, even among savages, although there is little evidence of an active sympathy for children. Stevenson said that the South Sea Islanders who practice infanticide and are capable of selling their

children into slavery are yet affectionate and patient with them.* Not all of ancient Greece was given over to infanticide and exposure. Ælian records that in Thebes these offences were punished by death.† Mahaffy thinks that the Greek practice of exposure of infants arose in a late period, and from economic motives in an overcrowded civilization.‡ In evidence, he cites the instances of sympathy for children in Homer, Herodotus, Euripides and Thucydides.§ In the sixth Iliad, there is the affecting farewell of Hector and Andromache. The hero bewails the impending fate of his wife and child, and tenderly lays aside his helmet lest the infant Astyanax, "fair as a star," be frightened at his nodding crest. In the subsequent lament of Andromache over the body of Hector, she bewails her widowhood and mourns the hard fate in store for her defenceless child.

Women, particularly great ladies like Helen, Andromache, Hecuba, Penelope, were held in high esteem by the Homeric Greeks and their children no less. There is evident tenderness for child-life in the similes of the Homeric poems. In the fourth Iliad (20), Minerva repels the arrow shot at Menelaus "as a mother drives away a fly from her child when it lies in sweet sleep." In the fifteenth Iliad (361), Apollo overthrows the earthworks of the Greeks as easily as a child playing by the sea tumbles the sandheaps it has made. At the beginning of the sixteenth Iliad, Achilles addresses the weeping Patroclus with winged words:

"Why weepest thou, O Patroclus, like an infant girl, who running along by her mother, begs to be taken up, and holding on by her dress, delays the hurrying woman, and looks at her with her eyes full of tears, in order that she may be taken up and carried."

Mahaffy emphasizes the strong love of children in the anecdotes of Herodotus, which sympathy is, in all likelihood, "his own or that of his age, even though the naked facts may be the heritage of a previous society." When the oligarchs of Corinth sent ten of their number, in deference to the oracle, to destroy Cypselus, the child of Eltion, the mother, Labda, unaware of their intentions, placed the infant in the hands of one of them; but its smile was so beautiful that the oligarch could not summon brutality to dash out its brains, so handed it to the second, he to the third, until it passed through their ten hands unscathed. When they finally resolved to accomplish the deed, the mother had safely hidden the child in a chest, and after a half-hearted search, they returned to say that they had done all that had been commanded (V, 92). Elsewhere, he tells how a house in Chios, "fell in upon some boys as they were learning to read, so that of one hundred and twenty boys only one escaped" (VI, 27). In another place, he

* Payne, *op. cit.*, p. 44.

† Ælian, Varia Hist., ii, p. 7. Cited by Lecky.

‡ J. P. Mahaffy, "Social Life in Greece from Homer to Menander." London (1913), p. 165.

§ *Ibid.*, pp. 163–169.

describes a Spartan nurse standing before the temple of Helen to pray that the goddess might make an ugly infant beautiful (VI, 61). Aristotle relates that when the oracle, in punning fashion, commanded the Malians to love the dearest of the dear (φιλεῖν τῶν φιλτάτον τὰ φίλτατα), they carried their naked infants about at feasts and kissed them. Themistocles, in Plutarch's Lives, declares that "his boy, who bullied his mother, was the greatest power in Greece: For the Athenians ruled the rest of Greece, Themistocles ruled the Athenians, his wife ruled him, and his boy ruled her." In the tragedies of Euripides, children appear upon the stage to heighten the pathos of a situation. In Thucydides (VII, 29), it is said that the massacre of a whole school of little boys at Mycalessus by a band of Thracian mercenaries was regarded as the outstanding instance of frightfulness in the whole Peloponnesian war, although in Mahaffy's view, the cold historian conceals his own emotions "under the most violent contortions of grammar."* There is thus abundant evidence of a tender regard for children in the ancient Greek civilization, in spite of the fact that exposure of infants was common at Athens, and was justified and almost defied in poetry and the drama, as being the lot of Zeus, Poseidon, Hephæstus, Æsculapius, Atalanta, Ion, Amphion and Œdipus. Let us remember, also, that it is precisely in Greek medicine that we find the only scientific body of pediatric literature of value before the advent of the masters of the eighteenth and nineteenth centuries.

Christianity and its votaries undoubtedly did much to elevate the status of the child and to remove its social disabilities. The figures of the Madonna and the Christ Child were enshrined in mediæval art; but it is not until the middle of the nineteenth century that we find any artistic and human feeling comparable with that of the Greeks. In modern civilization, the child is explicitly "the father of the man," the expression of the continuity of the germ-plasm, the means whereby the individual projects and propagates himself or herself into futurity. Ours is "The century of the child," a result partly due to art, partly to science and scientific legislation. About this tiny figure have clustered and concentrated all things that differentiate the altruistic from the self-regarding feelings, the best ethical ideas and sentiments in regard to the proper relations between men and women, the noblest aspirations of our time toward humanitarian and social legislation, some of the finest inspirations of poets, artists and musicians. The religious and legal sanctions of marriage exist solely for the benefit and protection of the child, only incidentally for the "respectability" of the contracting parties. With Rousseau's *Émile* (1762), a whole species of secular literature about children came into being, something which, in the past, had only existed in spots, as among the Greeks or in the episode of Mamilius in Shakespeare (A Winter's Tale). After the long nightmare of the French Revolution and the Napoleonic Wars, there was an actual springtide of hope and aspiration for European humanity. Poets of liberty arose—Shelley,

* Mahaffy, *op. cit.*, p. 168.

Byron, Wordsworth, Landor, Hugo, Swinburne—champions of liberty and liberal legislation, such as Stuart Mill, Beaconsfield, Peel, Gladstone, Louis Blanc, Armand Carrel, Mazzini, Kossuth—humanitarian novelists like Dickens, Charles Reade, Victor Hugo—everywhere, in fact, there was an upspringing of liberal sentiment and philanthropy. English labor legislation began in 1802 (Peel Act), child legislation in 1836. Victor Hugo's great prose epic on the miseries of the poor (*Les Misérables*) was completed in 1862. Three years later, the *loi Roussel* was passed (1865). Charles Dickens, whom Swinburne called "the greatest Englishman of his time," fought with tongue and pen for the rights of the child, to whom he devoted some of the choicest fantasies of his genius. Poetry about children culminated in such exquisite things as Victor Hugo's *L'art d'être grand-père*, Longfellow's *Delia* and *The Children's Hour*, Stevenson's *A Child's Garden of Verses*, and the dainty lyrics of Swinburne and Sir Rabindranath Tagore. The disabilities cast upon girls by female infanticide in the past have completely disappeared. The process of deification began with Dante's Beatrice. Goethe's Mignon, Dicken's Little Nell, Dr. John Brown's Marjorie Fleming, Victor Hugo's Cosette, linger in the memory as figures of essentially modern interest. The systematic spoiling of young women by cheap flattery and ill-considered adulation is a specific feature of recent life and of the more ephemeral sort of modern literature. The net-result has been to make the young person, in Boyesen's phrase, "a perfect little monster of human selfishness." The feeling of Andrea del Sarto, Correggio, Rubens and Vandyke about the child in painting has been revived in many modern canvasses. In music, such preludings as Haydn's *Toy Symphony*, Schumann's *Scenes of Childhood* and his *Album for the Young* were followed by endless imitations, even at the hands of Brahms, Tschaikowsky and Debussy. Schumann's "Requiem for Mignon" and Louis Ehlert's "Requiem for a Child" are examples of another *genre*. The child in folk-song is a modern revival. The cradle songs of Chopin, Grieg, Wagner and Brahms are full of poetic charm. The "Adventures in a Perambulator," an orchestral suite by John Alden Carpenter, of Chicago, is a most delightful specimen of American music. Richard Strauss has apotheosized the baby as the tyrant of the household in his "*Symphonia Domestica*," the squallings of the infant being rendered *fortissimo* by the full orchestra. To the old folk-tales of the past have been added Grimm, Hans Andersen and hosts of later things. Every Christmas brings out a flood of books, pictures and music about children. Thus the glorification of the child in modern life has been due to the artists, the poets, the writers, the musicians, rather than to the statists, philanthropists and legislators.

Let us now consider the **status of the child in folk-medicine.** From the moment of conception, the infant, born or unborn, is thought to be exposed to a swarm of evil demons who may inflict a disease or malformation upon the helpless child, or substitute one of their own brood for it as a changeling, and thus make it a cretin

or other monster (Ploss).* Witches and sorcerers may cast spells upon it or it may be subjected to the influence of the evil eye. Against these malign influences, all sorts of charms, amulets, talismans, incantations and spells are employed, the varied ritual of which makes up a large part of ethnic folklore. An equally complex and variegated ritual presides over the bathing, washing, swaddling, cradling, nursing, wet-nursing, artificial feeding, naming, baptism and carrying of the newborn infant among different peoples. These practices have been described in detail by Ploss (*Das Kind*).† The care of the sick child in the savage and semi-civilized state‡ forms another large chapter of anthropology. Apart from actual infanticide, the high mortality of infants and children among savage and primitive peoples is due mainly to one set of causes: Total ignorance of the proper care and hygiene of children, mental inability to evolve a proper hygienic scheme, with the natural indifference resulting from this state of mind. Primitive pathology invariably assigns demons, magicians, witches and angered gods as the efficient causes of disease, adult or infantile. Primitive therapy professes to dispose of these by prayers, incantations, charms and other manœuvres of the medicine man. In Imeretia (Caucasus), the mother of a sick child walks thrice around its bed and then prays upon her knees that the malignant *batoneti* will take her soul rather than her child's; prayers are offered by the father, and oxen, fowls or pigs are allowed to wander away as an offering to the demon. In the lower Congo region, a family consultation is held over the sick child, and a magician is summoned, whose diagnosis is inevitably "witchcraft." Among the Wahehe (East Africa), if a sick child does not get well, a soothsayer (*mlagasi*) is summoned, who, after learning the probable amount of his fee, moves an inverted mortar over the top of a stool, repeating a litany of diseases the while; the mortar stops when he achieves his diagnosis, which is further confirmed by revolving a horn about a stick, until it stops at the name of the presumable disease (Ploss). In England, Ireland, France and Germany, sick or rachitic children are passed through clefts or arching roots of trees, holes in large stones or other rocky formations, bell-ropes, ladders, etc. This is also a remedy for infantile hernia. Infantile convulsions ("*Fraisen*") are suppressed in Silesia by placing the mother's engagement ring or her bridal crown in the child's bed; in Bohemia, by administering milk mixed with soot from a candle-snuffer, or three cinders from the hearth, in the name of the Holy Trinity; in Moravia by casting a garment, snatched from the child's body, into a rapidly flowing stream; in Upper Austria by winding yarn, spun by a girl of seven, about the infant's neck. In

* H. Ploss, Das Kind im Brauch und Sitte der Völker, 3 Aufl. Leipzig, i, (1911), p. 100.

† *Ibid.*, pp. 211–514, *passim.*

‡ The details in this section are taken mainly from the chapter "Das kranke Kind" in Ploss, *op. cit.*, 515–547. The subject is even more elaborately treated in Hovorka and Kronfeld: Vergleichende Volksmedizin, Stuttgart, 1909, ii, pp. 632–718.

Lower Austria, talismanic necklaces are employed; in Moravia and Styria, little helmet-shaped caps (*Fraisenhauben*) decorated with religious emblems, are worn; in Styria, again, a "convulsion-clock" (*Fraisenuhr*) is wound up and chimes at intervals during the attack.* Among English folk-remedies for whooping cough in children are passing the child underneath animals or bushes, carrying it through a cloud of smoke, placing a live frog or the head of a trout in the child's mouth, giving it a soup cooked over a stream flowing from north to south, passing a tarred bandage around its neck, administering a roasted mouse or owl broth, or holding a decrepid spider over the patient's head while repeating the charm:

"Spider, as you waste away,
Whooping cough no longer stay."

Malaria, as we read in "Evangeline," was "cured by wearing a spider hung round one's neck in a nutshell." In Scotland, a consumptive child is passed through a wreath of woodbine, and on Mayday, sick children are taken to healing wells. In the Transvaal, Franks saw three sick children, painted green all over, with the exception of their faces, and all these succumbed to arsenic poisoning. The same observer saw a Boer mother give successively to a two year old child Hoffmann's drops, an opiate, a red powder containing tartar emetic, Jamaica ginger and Holland drops. Woodroffe prescribed for a Boer child, whose mother subsequently obtained another prescription from a second physician, in order to experiment with the two in succession. Cassia fistula and rhubarb are favorite infantile purgatives among primitive peoples. Clysters and vegetable emetics are frequently employed. The Zulus in Natal give the newborn a perfunctory clyster of the juice expressed from the roots of the "amasabele" (*Euphorbia pugniformis*), in warm milk, in order to "purify the stomach." As a vermifuge, they employ a decoction of "incamu" (*Othonna natalensis*). The use of opiates to quiet fretful infants is deplorably wide-spread among all peoples, savage, peasant or civilized. The exhibition of opium to stop a child's crying is as old as the Ebers Papyrus.† Syrups and decoctions of poppies or hyoscyamus are of common use for this purpose in the Orient, whence the pernicious custom spread among the Persians, Tartars and Armenians, and thence to Russia, the Germanic countries and the British Isles. Even in the forms known to city dwellers, as paregoric, soothing syrup, "Godfrey's Cordial," "Mother's Blessing," "Dalby's Carminative," etc., the exhibition of opium in teething and night-fears of infants is an almost universal folk-remedy,‡ which has led some anthropologists to derive it primarily from folk-intuition. To explain the genesis of intuitive folk-therapy, Hovorka postulates certain "laws of congruence," in virtue of which primitive

* Hovorka and Kronfeld, Vergleichende Volksmedizin, Stuttgart (1909), ii, pp. 674–684, *passim*.

† See H. E. L. Lüring, "Die über die medicinischen Kenntnisse der alten Aegypter berichtenden Papyri." Strassburg dissertation. Leipzig (1888), p. 45.

‡ Ploss, *op. cit.*, pp. 531–533.

man everywhere sought identical remedies instinctively for certain affections,* but the real explanation of "doping" the children is that the practice originated in the East, where the poppy abounded in nature. In therapeutics, however, the folk-mind has a notable tendency to favor the doctrine of "like cures like," *e.g.*, a drowsy syrup for a disorder of sleep. But, as a rule, the primitive doctor, vaguely sensing the fact that time and nature are often the best remedies, seeks every excuse for temporizing, and, in his attempt to "explain" the phenomena of disease, is easily led away into animism and mysticism.

The bad and sometimes fatal effects of the exhibition of opium in infants were early noted by Walter Harris (1689) and were described in impressive manner by the English physiologist Marshall Hall (1885),† but his essay did little to check this abuse. Some English druggists are said to have purchased over 200 pounds of opium annually for this purpose, and in one district an annual dispensation of 100 grains per caput was estimated.‡

We are now in position to review the history of pediatrics in the written and printed texts, beginning with the hieroglyphic and cuneiform inscriptions.

EGYPT

In Ancient Egypt, the military and priestly castes existed as beings set apart for sacred functions: The lot of the toilers, those in whom the hand was subdued to the material it worked in, was as that of the craftsmen in Ecclesiastes: "They shall not be sought for in public counsel, nor sit high in the congregation; they shall not sit on the judges' seat." Neuburger cites an early Egyptian sentence about the working classes: "The child is procreated only to be torn from its mother's arms—if he arrives at manhood, his bones are broken as those of an ass."§ But the civilization of Egypt was of matriarchal type. The mother-goddesses Hathor, Mut, and Neith, deifying the creative power of nature, the nature goddesses Anquet (fructifying power of Nile), Bast (fructifying heat of the Sun), the pregnant cow-goddess Mehurt (female creative principle), Nephthys (decay, death and immobility), Nut (Night), Satet (inundation of the Nile), Sekhet (destructive heat of the Sun), Tefnut (rain), also the birth goddesses Nekhebet and Taurt, who presided over obstetric functions, Meskhenit, who appeared at the child's cradle and Rannut who presided over the harvests, maternity and nursing, all bespeak the strength of the female and maternal element in the Egyptian pantheon. Isis the sister-spouse of Osiris, the type of the faithful wife and mother, is usually represented in the act of suckling Osiris. Women in the mural

* O. von Hovorka, Mitt. d. anthrop. Gesellsch. in Wien, 1915, xlv, pp. 125–136.

† Hall, "Practical Observations and Suggestions in Medicine." London (1845), pp. 174–176.

‡ Ploss, *op. cit.*, p. 532.

§ Neuburger, Geschichte der Medizin, Stuttgart, i, (1906), p. 52.

decorations and figurines are nearly always of comely, attractive semblance, and in the family groups there is every sign of affection. In the earlier Egyptian civilization, there are some evidences of human sacrifice, but no indications of "infanticide," or maltreatment of children. Egypt was a land of plenty, and children were well taken care of. Aristotle says explicitly that the Egyptian women bore many children and that all children born into life were well brought up. Diodorus Siculus (1st century, B.C.) records (I, 20) that the children of ancient Egypt were clothed and reared at a very trifling expense. He says of the ancient Egyptians that those who killed their children were not executed themselves, but were condemned to hug their dead offspring continually in their arms for three days and three nights, in order to experience their full deserts of horror and remorse (I, 6).* The items listed in Sudhoff's Catalogue of the Historical Section of the Dresden Hygienic Exposition (1911) suggest a highly specialized civilization with plenty of creature comforts.

The mural reliefs and frescoes from the temples show the threshing of grain (items 1101–8), the kneading of dough (1109–11), the harvesting of figs (1118), a market scene of the Old Empire, with stands for fish, vegetables, a fish-pond with ducks, in a rich park (1131), milking a cow (1162), a child suckled directly from the udders of the cow-goddess Hathor (1163), vintage and wine-making (1173–77), brewing beer (1178–84), a dining table set for the dead (1193), beds and wooden head-rests (1225–35), vanity cases (1307), manicures (1310), cosmetics (1311–12), combs (1323–5), mirrors (1327–9), razors (1331–48), a woman prinking herself with cosmetics before a mirror (1354), bathing in common (1397), the complaint of a Greek woman to Ptolemy (220 B.C.) that she had been parboiled in her bath by a careless attendant (1410), the *accouchement* of a queen on an obstetric chair, attended by four midwives (1423), Isis suckling and dandling Horus (1425–31), modes of carrying children (1432–38), dolls and balls of 600 B.C. (1439), children's games (1440–42), dancing (1443–45), statues of physicians (1496–99), amulets and scarabs (1502–14); Horus as averter of a pathogenic worm (1515); apotropaic reliefs of the child Horus against vermin (1516, 1518, 1523); a court official with a fly-flap (1524); aboriginal Egyptian rites for cult-cleanliness (1525); the interment of a child's corpse in a bed (1534), coffins, burial-rites, sarcophagi and mummies (1530–1632), and pathological preparations from diseased mummies (1630–1728).†

At birth, the Egyptian infant was not constricted in swaddling clothes but allowed to run about naked or carried about in loose, soft wrappings. After weaning, its diet was cow's milk only, later vegetable foods and water. It led a wholesome healthy existence in the open air, completely naked up to five, barefoot up to ten, playing with hoops, balls and dolls before taking up the "three R's" in school (Neuburger).‡ Ritual circumcision was performed upon boys of the priestly and warrior castes with a flint knife. Self abuse is named as a vice in the Book of the Dead.

Of Egyptian medicine, Homer says (Odyssey IV, 220–223): "There the fruitful earth brings forth many drugs, many excellent when mingled, and many fatal;

* Diodorus Siculus Historical Library, transl. by Booth: Vol, 1, par. 6, p. 79. Cited by Payne.

† "Internationale Hygiene-Ausstellung." Dresden (1911). "Historische Abteilung," 2. Aufl. Dresden (1911), pp. 33–54, *passim.*

‡ Neuburger, *op. cit.*, p. 52.

there every physician is skilled above all men; for truly they are of the race of Pæon."

Medicine in Egypt, as Herodotus tells us, was specialized to the extent of having a doctor for every disease. A set line of treatment was prescribed and if the patient died from any deviation from standardized practice, the physician was put to death; although in the time of Aristotle, a change of therapy was permissible after the fourth day, if the patient did not improve.

The principal sources of Egyptian medicine are, in order of antiquity, the badly preserved London Papyrus, edited and translated by Walter Wreszinski (1910), the Westcar (Lesser Berlin) papyrus, translated by Adolf Erman (1890), the Brugsch (Greater Berlin) papyrus, translated by Wreszinski (1909), the Papyrus Ebers, translated by H. Joachim (1890), the Hearst (Philadelphia) papyrus, containing about one half the Papyrus Ebers and the Kahun papyri of the Petrie Collection, translated by F. L. Griffiths (1893). Of principal interest for Egyptian pediatric lore are the Lesser Berlin and the Ebers papyri.

The Lesser Berlin Papyrus, or Papyrus of the Mother and Child (16th Century B.C.) is, for the most part, made up of wonder tales and magic charms. It contains only three prescriptions. Holmes cites a charm to be recited over a string of three beads (lapis lazuli, jasper, malachite) to be hung about the neck of the newborn. Part of another reads:

"The voice of the Re calls for the *Wpt*, because the stomach of this infant whom Isis has borne, is sick."*

The Papyrus Ebers (1550 B.C.), a beautiful document in hieratic script, the text in black, the rubrics in red, is an *édition de luxe*, probably prepared for some great temple. The fact that it is written in several dialects indicates that it is an encyclopedia or compilation. In its entirety, it was, no doubt, a summary of the medical and surgical therapeutics then known, like the summations (*summa medicinæ*) made in the Middle Ages or our modern "Systems of Medicine." It consists of some 50 sections in 108 columns, giving prescriptions for various diseases and classes of diseases. Only in the surgical section is there any indication of diagnosis. The tiny pediatric section is mainly prognostic. It reads:

"To get a supply of milk in a woman's breast for suckling a child: Warm the bones of a χra-fish (swordfish, Brugsch) in oil and rub her back with it. Or:
Let the woman sit cross-legged and eat fragrant bread of soured *durra*, while rubbing the parts with the poppy plant."
Prognosis for a child on the day of its birth:
If it cries *nee*, it will live; if it cries *bá* it will die.
Another prognostication:
If it wails loudly, it will die; if it drops its face downward, it will die immediately."†

Among the diseases likely to affect children, which are prescribed for in the Ebers Papyrus, we find those due to the *heft*-worm (*Ascaris lumbricoides*), the *pend*-worm (*Tænia mediocanellata*), diseases of the

* Bayard Holmes and P. G. Kitterman, "Medicine in Ancient Egypt." Cincinnati (1914), p. 13.
† H. Joachim, "Papyros Ebers." Berlin (1890), pp. 178–179.

Ro-ab (epigastric region), headache; ascites and urinary disorders; physical disability; diseases of the eye, the scalp, the skin, the teeth and ears; coryza and ozæna; animal parasites, fleas, lice and pruritus; abscesses and tumors. Purgatives and vermifuges abound, as also prescriptions for diarrhœa and obstinate vomiting. The following recipes are specified for retention of urine in children:

"An old book, cooked in oil, is smeared over the body, in order to produce urination in the child."

"Another prescription to regulate urination:

Straw of the nebat plant	⅛
Dates	¼
The stalk of the χas-it plant	¼
Honey	⅚
Berries of the uan-tree	¼
Water	1 dená

Strain and administer through four days running."

"Another prescription to regulate urination in a child: Bring blossoms of the nebat plant together with sweet beet in a cool flask for a girl to drink; but give it to a boy in a pitcher of hennu (0.465 litre) capacity."

"What one should do for a child that suffers from urination: χent corn warmed in a pill; if it is an older child let it take this with its nourishment; but if it is an infant, let it be given in the breast milk, the nurse warming it in her mouth and spurting it into the child's mouth."

"A remedy for incontinence of urine.

Juniper berries	1
Cyprus	1
Beer	1 hennu measure."*

An opiate is exhibited for the crying of a child.

"Capsules of the poppy-plant (?); excrement of wasps on the wall; rub together; strain and administer for four days running; it will stop immediately; as for crying, it is the child that cries."†

These prescriptions show that there was already differentiation as to drugging and dosage in treating the diseases of children and adults. There were even separate hieroglyphs for the infant and the child (Lüring).

Among the diseases from intestinal worms, there are many remedies for the tropical anemia variously known in the Ebers Papyrus as the uha disease (chronic constipation and meteorism), the uχedu disease (painful swelling of the body), and "the god-sent deadly āaā disease." It is probable that these were different phases of hookworm infection (*chlorosis Aegyptica*) or other parasitic anemias. In the opinion of Joachim, the āaā disease was ankylostomiasis, since precordial distress and palpitation of the heart is specified in the Papyrus (Lutz), and the disease was found by Pruner Bey, Bilharz and Griesinger, to be still prevalent in Egypt.‡ Edwin Pfister, however, maintains that the āaā disease was bilharziosis, since its determinative hieroglyph was a

* Joachim: *op. cit.*, 65, 67–68.
† *Ibid*; p. 169.
‡ *Ibid.*, pp. xiv–xvii.

phallus (bloody urine).* There is a special prescription for the *sa*-worm or *Filaria medinensis*.† Granular conjunctivitis (Egyptian ophthalmia), the contagious nature of which was first observed by Baron Larrey during Napoleon's Egyptian campaign (1802), is specified in the Ebers Papyrus as excessive lachrymation or "granulation" or "when too much water flows from the eye."‡ Corneal opacity, albugo, clouding of the lens and strabismus are prescribed for,§ and there are innumerable salves and collyria. The sections in the Ebers Papyrus on fatty tumors, suppuration and ulcers show definitely that surgical intervention obtained in these conditions ("treat it with the knife").‖ Toothache is attributed to the presence of the uχedu worm.¶ The researches of Elliot Smith and Wood Jones on pathological findings in Egyptian mummies from the Archæological Survey of Nubia (1907), show that there was no caries in the milk dentition of children of the Pre-Dynastic period. The luxurious habits of the New Empire produced deposits of tartar with caries and abscess formation, spreading to the alveoli. This condition in the mummies shows that the Egyptians had no dentistry, the alleged gold-filling of teeth being simply gilding, as part of the mortuary ritual. There is one disease, specified in the Papyrus Ebers as "hardening in the limbs" (and by the prescriptions "to make the joints limber"),** which is found in mummies of all historic periods, namely osteoarthritis deformans, and while this affected adults only, it began to attack them even in the third decade of life. An apparent case of infantile paralysis (poliomyelitis) is exhibited in a stele of the Eighteenth Dynasty in the Carlsberg Glyptothek, Copenhagen.†† Henri Meige describes a bronze statuette of a hump-backed Egyptian boy from the Museum at Bulaq, the deformities suggesting rickets or spondylitis deformans.‡‡ The innumerable figurines of the dwarf-gods Bes and Phthah are all achondroplasic (Charcot).§§ In the Alexandrian period, Egyptian medicine became Greek in type. In Sudhoff's study of the Oxyrhynchus and other Greek papyri of the period, considerable light is thrown upon the methods of wet-nursing and circumcision. The Hellenized ladies of the Ptolemaic period seldom nursed their own children. Definite contracts were made with slave-women, who stipulated to nourish the child on milk up to its third year (γαλακτοτροφια) for a definite sum and their living. During the first six months the nurse was to give the infant her own breast; during the remaining eighteen months, it was nourished artificially on cow's milk. There was a

* Pfister, Arch. f. Gesch. d. Med., Leipzig, 1912–13, vi, 12–20.
† Joachim: *op. cit.*, p. 134.
‡ *Ibid.*, pp. 81, 83; 86.
§ *Ibid.*, pp. 82; 85–87.
‖ Joachim: *op. cit.*, pp. 191–192.
¶ *Ibid.*, p. 161.
** *Ibid.*, pp. 130–134; 137–151.
†† O. Hamburger: Bull. Soc. franc. d'hist. de méd., Paris, 1911, x, pp. 407–412.
‡‡ Meige: Trav. de neurol. chir. (Chipault), Paris, 1897, ii, pp. 101–105.
§§ Charcot: "Les difformes et les malades dans l'art." Paris (1889), pp. 12–26.

regular daily delivery of "the best cow's milk" in a pitcher of 18 cotyles capacity; and unpunctual delivery was severely punished, but on legal, not on hygienic grounds.* The wet-nursing contracts called for "pure unadulterated milk," *i.e.*, that the nurse should not spoil her breast-milk by a faulty diet. A child's sucking bottle of the 2nd century, from Tebtunis, is in the Museum of Cairo (reproduced by Sudhoff). It is an ovoid flask of polished burnt clay, with a cylindrical neck and a nipple-shaped mouth-piece at the side.† The slaves who became gladiators, wet-nurses, harlots, etc., were recruited from the abandoned infants flung upon dung-heaps by heartless parents. If found by benevolent persons, they were usually wet-nursed and brought up. If not they were devoured by dogs and wild animals. Baby farming was practiced, and attended by the same cruelties that moderns know of.‡

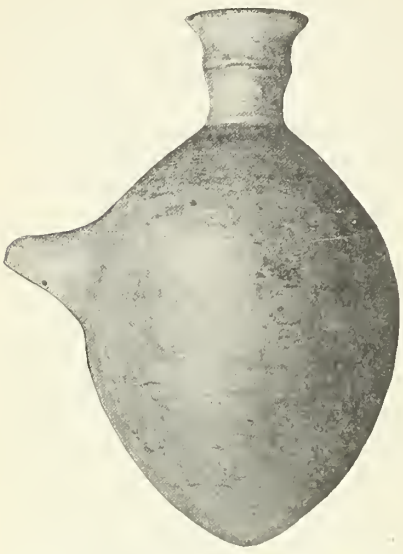

FIG. 1.—Egyptian nursing-flask of the Alexandrian period, with nipple (Cairo Museum). (From Sudhoff's Studien zur Geschichte der Medizin, Leipzig, 1909, Heft. 5–6, Pl. III.)

SUMER AND ACCAD

(Assyro-Babylonian Civilization [2800 B.C.–3310 B.C.])

The fertile plain between the Euphrates and the Tigris, "the land between the rivers," erstwhile Babylonia, later Mesopotamia, was originally divided between two primeval races. At the North was Accad, dominated by a Semitic race; at the South lay the Biblical "plain of Shinar" or Sumer, the inhabitants of which were non-Semitic. Whether the Sumerian culture preceded the Accadian or not is a matter of dispute, but it is known that the Sumerian characters (ideograms) contained Semitic elements, and it is probable that there was the usual interaction between the two cultures.

Secular History.§—The tug of war between the Sumerian and Accadian peoples occupied the earlier historical period, a period of massive architecture,

* K. Sudhoff: Aerztliches aus griechischen Papyrus-Urkunden (Stud. z. Gesch. d. Med., Heft 5–6)." Leipzig 1909, pp. 150–157.

† *Ibid.*, plate 3.

‡ *Ibid.*, pp 1. 58–159.

§ M. Jastrow: "Aspects of Religious Belief and Practice in Babylonia and Assyria." New York, 1911.

sun and moon gods, ornamented vases and other votive offerings to such gods, and illustrated clay seal cylinders with cuneiform characters, designed to be rolled over flat clay tablets as personal signatures to contracts and other business documents. Under Sargon and his son Naram-Sin, the Accadians first began to dominate this vast agricultural region; but about 2300 B.C., the Sumerians regained their ancient sway and their rulers were thenceforth known as "kings of Sumer and Accad." At the North of Accad, Hittite influences became predominant about 2100 B.C. A Hittite ruler occupied the throne of Babylon (Accadia) about 1800 B.C., and from a presumable fusion of Hittite and Amorite elements, the northernmost kingdom of Assyria arose. About 2000 B.C., the Sumerian power began to wane and the Semites centred their independent kingdom in the city of Babylon. With the accession of Hammurabi as "king of Babylon" (1958–1916 B.C.), the Accadian kingdom became known as the Babylonian Empire. The successive blows dealt by the warlike Assyrian kings Tiglath Pileser I (*circa* 1130–1100 B.C.), Ashurnasirpal (884–860 B.C.), Sennacherib (705–681 B.C.) and Esarhaddon (680–669 B.C.) eventually reduced Babylon to subjection. Babylon was destroyed by Sennacherib in 689 B.C., but after the brilliant reign of Ashurbanipal or Sardanapalus (668–626 B.C.), the Assyrian yoke was broken by Northern invaders at the fall of Nineveh (606 B.C.). The new Babylonian empire came under Chaldean influences under Nabopolassar (625–604 B.C.) and his, son Nebuchadnezzar (604–561 B.C.) Cyrus took Babylon in 539 B.C. but the Persian power was overthrown by Alexander the Great (331 B.C.). Thus the civilization called Assyro-Babylonian was influenced successively by the domination of five distinct racial and cultural strains, the Sumerian, Accadian (Semitic), Assyrian (Hittite), Chaldean and Persian.

In the older Sumerian pantheon, the sun, the moon, fertility in plants, animals and man, storm-power and water-power were deified and worshipped in various places as gods. In the period of Babylonian ascendancy, the storm-gods Enlil and Ninib give place to two new deities, Marduk, the sun- and water-god, the source of wisdom, and Nergal, representing the sun's destructive power, the god of pestilence, famine, war and death. Ninib was the ancient god of healing, and with him was always associated his consort Gula.*

But in the period of Assyrian domination, the mother-goddess Ishtar, as the consort of Ashur, a great god of the Assyrian pantheon, becomes the central figure of the Assyro-Babylonian culture. The ascendancy of Ishtar as mother-goddess is an index of the strong matriarchal element which prevailed in the Assyro-Babylonian period, an influence which, as Morris Jastrow points out, is characteristic of all ancient Semitic civilizations. Ishtar, identical with the planet Venus in Babylonian astrology, the Ashtoreth of the Canaanites, the Astarte of the Phœnicians, may be equated with Rhea and Hathor, the mother-goddesses of Crete and Egypt, or with the *alma genetrix* of Rome. Ishtar represents the generative principle in nature, "the *mater magna* who gives birth to everything that has life." She presides over fertility in vegetation, animals, and man, is simultaneously the goddess of love, of war and storms, the protectress of flocks and the universal nurse of mankind. In the votive figurines which have been found, she is represented as a nude figure of comely aspect, usually suckling a child supported on her left arm.

* For a full account of the Babylonian mythology, see M. Jastrow: "Aspects of Religious Belief and Practice in Babylonia and Assyria," New York (1911).

In a civilization with undoubted matriarchal tendencies, there is a strong presumption that children will be not unkindly treated. Babylonian alabaster dolls exist, and are remarkable for beauty. From

Fig. 2.—Terra-cotta reliefs and figurines of Ishtar (Babylonian mother-goddess).

the items listed in the Assyro-Babylonian group in Sudhoff's Catalogue of the Dresden Hygienic Exhibit (Historical Section), we get some idea of the degree of civilization of these remarkable peoples.

Reliefs and bronzes show King Ashurbanipal and his queen dining in the open under a grape-arbor (621); the interior of a Babylonian tent, in which beds are made, flies are driven away, and tables with low seats are set for dining (621); King Ashurbanipal under a parasol held by eunuchs (731); Sennacherib under a parasol in a deer-park, with a coach drawn by men (732); boxing to the accompaniment of drums and castanets (742); riding and hunting scenes (742–3); swimming with bladders (745–6); the transportation of a huge stone colossus in a vehicle drawn by men (758); business archives and contracts in cuneiform characters on clay tablets (788–803), and the slipper-shaped coffins, capsule tombs and fan-shaped sarcophagi for disposal of the dead (807–845). Among the medical and pediatric items are the duties of a nurse, from the Code Hammurabi (611); the remarkable Babylonian wells, drainage pipes and latrines (636–648); prescriptions for cult-cleanliness (650); rites for the purification of a city contaminated by excreta of sick people (650); children's clothing in the time of Ashurbanipal, from a relief at Nineveh (675); a woman suckling her child, from a Hittite relief (705); fly-flaps (716–18); laws against the injury of pregnant women (736); physicians' seals (762–3); cuneiform prescriptions for a skin disease (765); models of the liver (766–7); amulets (779–80); vultures as scavengers of the battle-field, with collection of the fallen dead in a common pit (806), and children's coffins (816–17).*

In the **Code of Hammurabi** (2250 B.C.) we find the strongest evidence of equitable dealing with women and children in Babylon. The Code-Hammurabi is perhaps the oldest codification of laws known. In simplicity and directness of statement it is a model of what a lawbook should be. There is no pettifogging or obscuration; everything is expressed with such unmistakable clearness that it could be understood even by the unlettered and ignorant. There are some harsh rigors and

* Sudhoff: Dresden Catalogue (1911), pp. 20–28.

the *lex talionis* ("an eye for an eye, a tooth for a tooth") is prominent, but with inexerable fairness.

Adultery, seduction, rape and incest were punishable by death. The loss of any part of the body in an assault was punished by the loss of the same part in the offender. If a son denied his parents, his tongue was excised (192); if he hated them, he lost an eye (193); if he struck his father, his fingers were cut off (195); if a nurse allowed a suckling to die on her hands and substituted another, her breast was amputated (194); if a man struck a pregnant woman producing miscarriage, he had to pay the expenses to ten silver shekels (209); if she died, the offender's daughter was put to death (210). A man in debt might sell his wife, son or daughter or bind them out for service for three years, after which they were free (117). If a man put away a wife or concubine, he must make good her dowry; if she had children, their support was assured (137–8). If a wife died, her dowry went to her children (162); if she had a successor, the children of the two marriages inherited the dowries of their respective mothers and an equal share of their father's effects (167). Property deeded to a widow by her husband could not be sold but went to her children after her death (171). The children of a slave (father or mother) were free, if the other parent was free (171, 175). If a woman married twice, she inherited a son's full share of his estate (180). An adopted child could not be claimed by anyone (185). If an adopted son were not fairly treated, he might return to his father's house (189–190); an adopted child could not be disinherited by its foster parent, unless he received one third of a son's portion in advance (191).*

Thus the attitude of Babylon toward women and children was that of a nation of lawgivers. They were severely punished for infractions of the Code, but otherwise treated with absolute, unswerving justice. Long before Hammurabi, King Urukagina did much for the maintenance of the family by abolishing the briberies connected with the divorce laws. Mothers were pensioned that their children might be educated. Women could hold property and maintain their property rights. The signature of the queen was added to that of the king in all public documents. In a statistical table of the time giving the provisions made for women attached to the temple of Bau, 552 women, 132 girls and 97 boys are enumerated. The preponderance of the female element shows that there was no prejudice against girls nor any female infanticide. The Sumerian family seldom included more than four infants. The Assyrian Doomsday Book (Liber Censualis) of the 7th Century B.C. enumerates 68 husbands with 94 wives, 74 sons and 26 daughters, but in some of the families, there were three daughters to one son. Most of the families were limited to one or two sons, which suggests birth control, but not female infanticide.† The modesty of Babylonian art has been noted by Ward. In the items of female costume listed by Sudhoff in his Dresden Catalogue (652–705), there is no evidence of deliberate exposure of the breasts, as in Egypt, primordial Crete or even Hellas. Women were well covered by the Sumerian mantles and Semitic plaids, which were wrapped about the body in terrace-fashion. The comeliness of the Babylonian female figurines and dolls suggests the kind of lively appreciation which leads women to conserve their beauty.

* R. F. Harper: "The Code of Hammurabi," Chicago (1904), *passim.*
† G. K. Payne: "The Child," New York (1916), pp. 95–105.

Herodotus describes the Babylonians as having no physicians, the sick being placed in the market place to receive the advice of every passer-by. But the rigorous regulation of medical fees in the Code Hammurabi suggests an advanced stage of specialization in medical practice, even in remote antiquity (2250 B.C.). The essential features of Babylonian medicine were the attribution of each disease to a special demon; diagnosis by inspection; prognosis by divination, liver-inspection (hepatoscopy), birth omens, disease omens and astrological portents; therapy by exorcision and exhibition of herbal remedies; prophylaxis by incantation (Jastrow).* In the Sudhoff Catalogue, there are listed bronze figurations of Utukku, the demon of the throat disease, possibly diphtheria (775*a*), and exorcisms against Labartu, the demon who threatens the lying-in woman and her new-born child (776–783). In a bronze tablet, described by Morris Jastrow, there are seven demons of disease, terrible in aspect, and Labartu appears as a horrible figure "holding a serpent in each hand, with swine sucking at her breasts." Exorcisers, clad in the robes of the god Ea, stand at either end of the sick bed, sprinkling the patient with some compound to drive the particular demon away.† The terra cotta models of sheeps' livers for divination, some of them 3,000 years old, divided off into squares, with prophetic inscriptions, are better examples of anatomical illustration than the five-lobed livers of the medieval anatomists. The liver was the source of blood and the seat of the soul, and to see into the soul gave insight into the mind of the god, when enterprises of moment were contemplated.

The Babylonian **birth omens,** of which the study of physiognomy and phrenology were by-products (Jastrow), were connected with the primitive awe for "the mysterious phenomenon of a new life issuing from another." Babylonian pediatrics was, in fact, mainly concerned with this variety of prognostication. Any abnormity or monstrosity in an infant or an animal at birth was prognostic of its future welfare. "An abnormally large organ pointed to extension, to power, to success; an abnormally small one to weakness, disease and failure" (Jastrow). This is in agreement with Adler's psychological theory of "organ inferiority" as a cause of mental depression and discouragement. Abnormality or hypertrophy on the right side concerned the patient, on the left side his enemy. The Babylonian birth omens have been studied by Boissier (1894), Jastrow (1913) and Dennefeld (1914). A few specimens, from Jastrow's study are subjoined:

"If a woman gives birth to twins in an abnormal condition, the land will perish, the house of the man will be destroyed.

"If a woman gives birth to two girls, the house will be destroyed.

"If a woman gives birth and the right ear is small, the house of the man will be destroyed; if the left ear is small, the house of the man will be enlarged; if both ears are small, the house of the man will be overthrown.

"If a woman gives birth and there are six toes on the right and on the left foot, the children will encounter misfortune.

* M. Jastrow, Proc. Roy. Soc. Med., Lond., vii (1914), pp. 109–176, *passim.*
† *Ibid.*, p. 137.

"If a woman gives birth and the child has a lion's ear, a powerful king will rule the land.

"If a woman gives birth and the upper lip rides over the lower one (agnathy), he will attain favor."*

While these omens, as in the savage, suggest a motive for infanticide, yet it seems probable, given the Babylonian's regard for the inexorable and irrevocable in law and accomplished fact, that infanticide in itself was not regarded as releasing the land or the individual from the ineluctable fate contained in the specific omen.

There were also omens of the same kind connected with the interpretation of peculiarities in disease, or the symptoms of disease.

In the treatment of disease, a pain in a definite locality implied that a demon was *eating* that locality; a symptom like fever or headache implied that the part affected was "seized" by the demon. In the Middle Ages, this Babylonian concept of seizure or possession by demons (*sibtu*) was still applied to epilepsy (*bennu*). Epilepsy was then regarded as contagious and there were actual isolation hospitals for epileptics in the medieval period (Sudhoff). Babylonian therapy was of two kinds, that in which exorcism and incantations were secondary to the exhibition of remedies, and that in which the use of drugs was subordinated to magic rites (Jastrow). Over three hundred drugs were known and divided, Jastrow believes, into organic (*shammu*) and inorganic (*abnu*). Thus a cold in the stomach (gastritis) was treated by drinking a decoction of licorice and six other drug simples in wine, night and morning; the patient was then taken into a boat and incantations were pronounced over him. As alternatives, the white meat of pork was sucked, to coax the demon out, salt and water were taken with the food, a kneeling posture, to relax the muscles of the abdomen, was assumed, hot or cold water was poured over the body, to stimulate the circulation, and even postures and rolling were employed.† Nauseating remedies were sometimes given to disgust the demon. Dietetic schemes were followed in digestive disorders. Massage was known and employed. The principal diseases known were those of the liver or gall-bladder (jaundice), the eye, the heart, the stomach, also rheumatism, neuralgia, and the *mangu* disease, which was probably diphtheria.

Strongly suggestive of the *Consilia* of the Middle Ages are the following letters (cited by Jastrow) from the physician Arad-Nanâ to the King Assurbanipal on certain ailments of his little son.‡ In each, Ninib, the god of healing and his consort Gula are invoked.

"Arad Nanâ to the king My Lord, Thy servant Arad Nanâ. Hearty greetings to the king, My Lord. May Ninib and Gula grant happiness and health to the king My Lord.

Hearty greetings to the little chap whose eye causes him trouble. I put a

* M. Jastrow: "Babylonian-Assyrian Birth Omens and Their Cultural Significance," Giessen (1914), *passim.*

† Jastrow, Proc. Roy. Soc. Med. Sect. Hist. Med., Lond., vii (1914), pp. 131–133.

‡ *Ibid.*, pp. 147–149.

bandage on his face. Yesterday, towards evening, I took off the bandage that had been applied, removing also the dressing below, and there was blood in the dressing as much as the point of a little finger. To whichever one of thy gods this is due, his command has surely been heeded.

Hearty greetings. Let the king My Lord rest assured; in seven or eight days he will be well."

The second deals with epistaxis:

"Hearty greetings to the king's son. The treatment which we prescribe for him is to be given every two-thirds of a double hour during the day.

In regard to the bleeding of his nose about which the Rab-Mugi has reported to me that yesterday toward evening there was much bleeding, those dressings are not properly applied; they have been placed upon the alæ of the nose, obstructing the breathing, while at the same time the blood flows into the mouth. Let the nose be plugged up to the back so that air will be held off and the bleeding will cease. If it please the king I will come to look at it tomorrow. Meanwhile, may I hear good news."

It is plain that royal physicians in the reign of Sardanapalus (668–626 B.C.) were what they are today.

In **preventive medicine,** the Babylonians had an eye to the harmful effects of insects, worms and parasites. They made long lists of them on clay tablets (Sudhoff, item 804), and even classified them. A cylinder seal in Pierpont Morgan's collection bears the "Fly-Symbol" of Nergal, the Mesopotamian god of disease and death. "Swatting the fly" appears to have been a Babylonian institution. Sudhoff's Catalogue includes a fly-flap as part of the trousseau of a Mitanni princess (716); a Hittite relief of a servant by the dinner-table with a fly-fan (718), and a Persian relief of a fly-flap of the time of King Darius (730). That children of the better class were similarly protected there can be little doubt.

The medicine of ancient Persia was limited to casting out the demons of disease, herbal therapy and the Zoroastrian rites of purification and cult-cleanliness. In such a system, pediatrics never even attained the gerundive mood of being about to be.

INDIA

In ancient India, as we have seen, the warrior-gentleman predominated, the caste system was rigid, the status of women was low, abortion and infanticide were common.

In the earliest Sanskrit texts, medicine is entirely theurgic, made up of spells and incantations against the demons of disease. The Rig Veda (1500 B.C.) is the folk hymnal of the Aryans of Northwestern India at the time of their successive westward migrations. In this great folk-song, women enjoy an elevated position similar to that in the Homeric poems. Beautiful hymns were chanted in their praise. Husband and wife were on a footing of equality as "rulers of the household," and there is no evidence of the burning of widows. Beef and beer from the juice of the *soma* or moon-plant (*Asclepias acida*) were the foods of these hardy nomads. The hymns of the ninth book

of the Rig Veda, which is taken up with the deification of the *soma* as "overlord of plants," are called *pavamani* or "purificational" because they were recited while the juice expressed from the plant was clarifying. That physicians were employed and paid for their services in the time of the Rig Veda is evidenced by Neuburger's citations to the effect that the physician hopes to get by his cures "horse, cattle and clothes;" also, "The waggoner desires wood, the doctor sickness, the priest libations."* The tenth book of the Rig Veda contains a larger number of verses dealing with superstitious practices. About 1,350 of these are also found in the Atharva Veda Samhita, which belongs to a much later period, and consists mainly of spells and incantations. Many of the *mantras* or sacred sayings of the Atharva Veda are medical in character. This text may therefore be taken as representative of the germinal Vedic period (1500–800 B.C.) when medicine and magic were synonymous.

Employing Whitney's translation† a few pediatric charms of the Atharva Veda will suffice to illustrate this phase of our subject:

For Welfare and Long Life of an Infant (ii, 13)

1. "Giving life-time, O Agni, choosing old age, ghee-fronted, ghee-backed, O Agni, having drunk the sweet pleasant ghee of the cow; do afterward defend this boy as a father his sons.

4. Come, stand on the stone; let they body become a stone; let all the gods make thy life-time a hundred autumns.

5. Thee here, of whom we take the garment to be first worn, let all the gods favor; thee here, growing with food growth, let many brothers be born after, as one well born."

Against Worms (v, 23)

2. "O Indra, lord of riches, smite thou the worms of this boy; smitten are all niggards by thy formidable spell.

3. What one creeps about his eyes, what one creeps about his nostrils, what one goes to the midst of his teeth—that worm we grind up.

5. The worms that are white-sided, that are black with white arms, and whatever ones are of all forms—those worms we grind up.

6. Up in the east the sun, seen of all, slayer of the unseen, slaying both those seen and unseen, and slaughtering all worms.

9. The three-headed, the three-humped, the variegated, the whitish worm—I crush the ribs of it; I hew at its head.

13. Both of all worms and of all she-worms I split the head with a stone, I burn the mouth with fire."

For Birth of Sons (vi, 11)

2. "In the male, indeed, grows the seed; that is poured along into the woman; that verily is the obtainment of a son; that Prājapati said.

3. Prājapati, Anumati, Sinivālī hath shaped; may he put elsewhere woman-birth; but may he put here a male."

To Guard a Pregnant Woman from Demons (viii, 6)

9. "Whoever makes this woman having a dead child, or a miscarriage, him, O herb, do thou make disappear.

* Neuburger: "History of Medicine." Transl. by E. Playfair, London, i (1910), p. 45.

† W. D. Whitney: Atharva-Veda Samhita (Harvard Oriental Series, vols. vii–viii), Cambridge (1905), *passim.*

18. Whoever shall handle thy embryo, or shall make it born dead—let the brown one, with formidable bow, make him pierced to the heart.

Against Various Diseases (ix, 8)

1. "Headache, head-ailment, earache, anemia, every head disease of thine, do we expel out of thee by incantation.

21. Forth from they feet, knees, hips, buttocks, spine, nape, the pains from they head, the disease have I made disappear."

In the Brahministic period (800 B.C.–1000 B.C.), Indian medicine attained its height. Well-trained physicians, descended on the father's side from Brahmins, belonged to an exalted mixed caste. The center of medical training was the sacred city of Benares, the seat of Brahministic learning. Aryan medicine in this period is remarkable for the highest development of surgery in antiquity, for a highly elaborated vegetable materia medica and poison-lore, including the use of hyoscyamus and Cannabis indica as soporifics in surgery, and a definite recognition of such facts as the symptoms and sweetish urine of diabetes, the transmission of malarial fever by mosquito-bites and the relation between bubonic plague and rats.

The three basic texts of Brahminical medicine are the works of Susruta (2nd Century B.C.) Charaka (1st Century A.D.), and Vagbhata (7th Century A.D.). It is in Indian medicine that we encounter for the first time a reasoned, consistent body of pediatric doctrine. Taking the **Susruta Samhita** as the most representative scripture, we find a well-defined section on pediatrics in the chapter on pregnancy.* After severing the umbilical cord, the baby's face is sprayed with cold water, and it is allowed to lick an electuary of honey, clarified butter, gold-dust and the expressed juices of *Bráhmi* leaves and *Anantā* from the ring-finger of the feeder. The body of the infant is then anointed and bathed with infusions of certain barks, or with decoctions of certain leaves or drugs, or in water in which red-hot gold or silver bars have been immersed, according to the season or the physical condition of the child. Breast-feeding is postponed until the fourth day after birth. Prior to breast-feeding, the necessary evacuation of the meconium is attained by the simple device of giving a little honey, a procedure afterward standardized by Rufus and Soranus of Ephesus; its *raison d'être* was apparently that of the "sugar diarrhea" of Orgler, Allen, Talbot and other metabolists. On the first day, the baby is fed at morning, noon and evening with a child's handful of clarified butter and honey mixed with pulverized *Anantā* roots, sanctified by the recitation of *mantras*. On the second and third days, the diet is clarified butter prepared with the *Lakshaná* root. On the fourth day, the child is given its own handful of honey and clarified butter at morning and noon; in the evening, the mother squeezes off a quantity of her own milk and gives the child her breast. The infant is wrapped in silk, laid on a bed covered with a silken sheet, and fanned with the branches of certain trees. A thin pad, soaked in oil, is kept constantly

* An English Translation of the Sushruta Samhita, Calcutta, ii (1907–16), pp. 221–232.

on its head, and its body is fumigated with the fumes of mustard, or other drugs, to avert evil spirits. The same drugs are also tied around its head, neck, hands and feet, for this purpose, and the floor of the lying-in room is strewn with pounded sesamum, mustard and linseed. On the tenth day of its life, the rites of benediction are performed, and the child is named. A wet-nurse, when required, is selected from the matrons of the child's own caste. She shall be neither too young nor too old, too thin or too corpulent, of sound health and good character, "of an affectionate heart and *with all her children living*," nowise addicted to gambling, debauchery, day-sleeping, etc. The breasts should be neither pendulous nor contracted, the milk plentiful and of good quality. Upturned or unprominent nipples may deform the child's mouth; flabby, pendulous breasts may suffocate it. At nursing, on an auspicious day, the child, its head well-washed, is laid on the woman's lap, wrapped in clean, untorn linen, with its face to the north while the nurse looks to the east; a small quantity of milk is pressed out of the right breast, and before lactation the breast is washed and consecrated by the recitation of the following *mantras*, as part of the rite:

"O thou beautiful damsel, may the four oceans of the earth contribute to the secretion of milk in thy breasts for the purpose of improving the bodily strength of the child. O, thou, with a beautiful face, may the child, reared on your milk, attain a long life, like the gods made immortal with drinks of ambrosia."

If a careless or inexperienced wet-nurse is employed, one who does not press out the superfluous milk before suckling, the child may be troubled with coughing, suffocation or vomiting. If there is loss or suppression of milk in the mother, from anger, grief or lack of affection for her child, her equanimity should be restored and a flow of milk brought on by a generous diet of rice, barley, wheat, wine, sesamum-paste, garlic, fish, lotus-stalk, etc. Breast-milk is tested by casting it in water. Pure and healthy milk is thin, cold, clear, the color of a conch-shell, easily miscible with water, neither floating nor sinking, and producing neither froths nor shreds. The child should not be permitted to suck from the breast of a woman who is hungry, aggrieved, tired, feverish, pregnant, who has a bad digestion, acid stomach, or is otherwise unhealthy; if medicine has to be administered to the child, it should not be suckled until the drug is assimilated.

In the diagnosis of infantile diseases, it is noted that the child constantly touches the part affected or cries at the least touch of it. If the disease is in the head, the child cannot raise it or move it about, and remains with its eyes closely shut. If the bladder is affected, there is retention of urine, thirst, pain and occasional fainting spells. If there is trouble in the colon, the affection is indicated by retention of urine, constipation, discolored complexion, vomiting, distention of the abdomen and gurgling of the intestines (colonic impaction or Hirschsprung's disease). Constant crying indicates a general infection or diathesis. Diseases of all kinds, which might affect children, are

described in other parts of the Susruta, in particular "spleen belly" (enlargement and displacement of the spleen), "liver-swelling," vertigo, epilepsy, hemicrania, tetanus, malarial fever, cholera, smallpox, intestinal worms, skin and venereal affections, but as Neuburger observes, the innumerable varieties of these diseases indicate that each was "nothing but a vague symptom-complex, which, upon the slightest deviation from its supposed type, dissolved itself to reappear in a number of fresh categories."* As with the Egyptians and the Babylonians, many ailments of the eyes, teeth, ears, head, and heart were ascribed to the presence of "worms" and treated with charms. The various remedies recommended for different diseases in the Susruta are usually recommended for the same diseases in infants and children, but in doses of milder potency. In such instances, the dose is administered either through the vehicle of milk and clarified butter, or by the nurse who swallows the remedy herself, so that the child may get the effect through the breast-milk; or else plasters it as a paste over her breasts. If the child is living on solid food, the remedy is administered as a decoction. A small pinchful of medicine may be given to an infant at the end of its first month of life, if necessary. There are indications of dosage to suit the age of the child. If the child is fed on milk and rice, medicated pastes the size of plum-stones are given; if it feeds on rice or other solid foods, the dose is the size of a plum. If a nursling has fever, it should not be allowed to suck, lest thirst develop. Purgatives and emetics are forbidden, unless a disease threatens to take a fatal turn. A swollen and painful umbilicus (*tundi*) is treated by applying fomentations, medicated oils, etc. Special infantile elixirs, prepared by cooking clarified butter with decoctions of various vegetable principles are given to infants fed on liquid, semisolid or solid foods. The infant should be carefully handled, never scolded nor roused suddenly from sleep. It should be fondled and amused with toys, and never taken up or laid down suddenly. It should not be made to sit upright too early, for fear of deformation. It should not be exposed to rain, the glare of sunlight or lightning, heat, smoke or dust, nor should it be left under a tree, a vine, in low-lands, in lonely houses or caves. The child should always be kept in the inner part of the house, and to protect it from the malignant influences of evil stars and occult powers, religious rites are performed.

Such are the principles of pediatrics in the Brahminical period of Indian medicine, a clear, rational body of doctrine which is not excelled by that of any other race or nation before the Greeks or the later Europeans.

* Neuburger: "History of Medicine," London, ii (1910), p. 56. The tendency to give to symptoms and syndromes the dignity of definite diseases or "clinical entities," standing upon their own feet, impeded the progress of medicine for a long time and is still chronic in certain quarters. The tendency is amusingly illustrated in the 228 varieties of syphilis listed by Brassavola. See C. G. Gruner, "Morborum Antiquitates," Breslau (1774), pp. 85–100.

ISRAEL

The facts and findings of Jewish medicine were never cast into the form of a definite canon, or scripture, but are scattered throughout the Old and New Testaments and the Talmud. What we know of the subject is due to the synthetic work of Thomas Bartholinus, Richard Meade, J. B. Friedreich, A. H. Israels, Julius Preuss, W. Ebstein and other scholars. The main features of Biblical medicine (Old Testament) are a clear recognition of contagion as a fact, with the institution of prophylactic measures against certain infectious diseases by the high priests (as medical police), the rigid regulation of sexual hygiene, with medico-legal *expertise* by the priests, and the institution of the Sabbath as a weekly day of rest. In Talmudic medicine, the presence of an epidemic disease in a community was actually announced by blast of trumpet. Apart from the foundation of preventive medicine, the ritual hygiene and cult-cleanliness of the Hebrews were indeed remarkable, but are attributable to the interaction of several cultures in the 8th–6th Centuries B.C., or (in a dictum of Huxley's) "only one of several sporadic indications of some powerful mental ferment over the whole of the area comprised between the Ægean and Northern Hindustan." "What are today considered fixtures of ancient Semitic cult-hygiene," says Sudhoff, "originated almost exclusively after the Exodus, therefore after the time during which the people of Israel had been exposed for decades to the influence of racially and intellectually kindred civilizations along the Euphrates and the Nile." Personal hygiene with intention, including athletics and cult-cleanliness, was largely Greek in origin. "Even ritual uncleanness of women," Sudhoff insists, "is ancient property of Greece."

In the Old Testament, diseases is attributed not to demons but to the wrath of God, who alone can confer health. In the New Testament, demons are sometimes exorcised in certain cases of "possession."

Modern civilization flows from two main streams of culture, the Hellenic and the Hebraic. Hellenism gave us science, art, and the principles of good taste; Judaism gave us religion and certain ethical principles for regulating the conduct of our lives which are the basis of all ultimate strengthening and refinement of character. That the Hebrews set great store by children is everywhere apparent. In the **Bible,** children are a blessing; childlessness is a curse.

"The children which God hath graciously given Thy servant" (Genesis, xxxiii, 30).

"Write ye this man childless, a man that shall not prosper in his days" (Jeremiah, xxii, 30).

"Lo, children are an heritage of the Lord; and the fruit of the womb is his reward" (Psalms, cxxvii, 3).

"Children's children are the crown of old men" (Proverbs, XVII, 6).

Tacitus (History, V, 5) ascribes the prohibition of infanticide among the Jews to their desire to increase the population.* Male children were

* Lecky, "History of European Morals," New York, ii (1869), p. 28, footnote 1.

especially valued, as future priests or soldiers, and a bright, sagacious boy was the joy of his parents:

"A wise son maketh a glad father; but a foolish son is the heaviness of his mother" (Proverbs, X, 1).

"He that begetteth a fool doeth it to his sorrow; and the father of a fool hath no joy" (Proverbs, XVII, 1).

The feeling of all ancient civilizations against female offspring is sensed in the impressive words of Jesus Sirach (XLII, 9):

"A daughter is to her father a secret sorrow: care for her welfare robs him of his sleep; in her youth, that she may not fade; in wedlock, that she be not hated; in the time of her virginity, that she be not dishonored, nor become pregnant in her father's house; in her betrothal, that she become not frivolous; in her married life, that she be not sterile."

Under the stern moral and religious code of Israel, child-life was hedged in from the start by a veritable quickset of interdictions and inhibitions, which, as evident from the New Testament, were carried over into Christian doctrine. These teachings made for integrity and strength of character, but rendered the child's life dreary through the pragmatic character of their ethical intention. The child wishes to live uninhibited in an ideal frictionless medium, but even at the tenderest age, it has to learn that it cannot.

"Even a child is known by his ways; whether his work be pure and whether it be right" (Proverbs, XX, 11).

"Train up a child in the way he should go; and when he is old, he will not depart from it" (Proverbs, XXII, 6).

"A fool despiseth his father's instruction" (Proverbs, XV, 5).

"Children obey your parents" (Ephesians, VI, 1; Colossians, III, 20).

"One that ruleth well his own house, having his children in subjection with all gravity" (Timothy, III, 4).

"We have had fathers of our flesh which corrected us" (Hebrews, XII, 9).

"Likewise, ye younger, submit yourselves unto the elder" (Hebrews, V, 5).

"Now I say that the heir, as long as he is a child, differeth nothing from a servant, though he be lord of all. But is under tutors and governors until the time appointed of his father" (Galatians, IV, 1–2).

In the older texts, rebellious or refractory children are viewed with the severity of the Code Hammurabi.

"And he that smiteth his father or his mother, shall be surely put to death" (Exodus, XXI, 15).

"Cursed be he that setteth light by his father or his mother" (Deuteronomy, XXVII, 16).

"The eye that mocketh at his father, and despiseth to obey his mother, the ravens of the valley shall pick out, and the young eagles shall eat it" (Proverbs, XXX, 17).

"Whoso curseth father and mother, let him die the death" (Mark, VII, 10).

In Deuteronomy (XXI, 18–21), a stubborn and rebellious son shall be stoned to death by the elders of the city. The little children who mocked the baldness of Elisha were cursed by the prophet, and forty-two of them were torn by two she-bears that came out of the wood (II Kings, II, 23–24).

Instances of sacrifice of the first-born, as in the case of Abraham and Isaac (Genesis, XXII), or of Mesha, king of Moab, who sacrificed the

eldest son of the king of Edom (II Kings, III, 27), evidently go back to remote antiquity; for, as with the Greeks and Romans, this rite was, in time, modified by the substitution of some animal as a scapegoat. The hideous rite of passing children through the fire to Moloch was of Phœnician origin, and practiced by the Carthaginians. It fell upon Israel through the insidious effect of contact with the idolatrous ritual of barbaric peoples. Thus, Ahaz, king of Jerusalem, "burnt his children in the fire, after the abominations of the heathen whom the Lord had cast out before the children of Israel" (II Kings, XVI, 3; II Chronicles, XXVII, 3). Manasseh, who ruled fifty-five years in Jerusalem, "made his son pass through the fire." The practice was severely denounced in the fulminations of the Hebrew prophets:

"For when ye offer your gifts, when ye make your sons to pass through the fire, ye pollute yourselves with all your idols, even unto this day" (Ezekiel, XX, 31).

"Against whom do ye sport yourselves? Against whom do ye make a wide mouth, and draw out the tongue? Are ye not the children of transgression, a seed of falsehood,

Inflaming yourselves with idols under every green tree, slaying the children in the valleys under the clefts of the rocks?" (Isaiah, LVII, 4–5).

"Yea, they sacrificed their sons and their daughters unto devils, and shed innocent blood, even the blood of their sons and daughters, whom they sacrificed into the idols of Canaan: and the land was polluted with blood" (Psalms, CVI, 37–38).

Our knowledge of ancient Jewish pediatrics is mainly drawn from that great body of scholastic and mystic commentation on the five books of the Mosaic law (Torah or Pentateuch) which began to accumulate after the Babylonian captivity (536 B.C.) and which makes up the **Talmud.** In contradistinction to the written law of the Torah, the Talmud consists of the law transmitted by verbal tradition (Mishna) with its many interpretations and commentaries (Gemara). There are two Talmuds: The Palestinian, completed 370–390 A.D., and the Babylonian, completed 352–427 A.D. The Babylonian Talmud is the Talmud of ordinary reference.

In the Talmudic ritual which attended the ushering of the new-born child into the world, there is evidence of ancient practice, and also of superstition. If the child was born with a caul, it was a sign of good luck. If it was a boy, he was greeted with the phrase: "A blessing has come into the world;" if it was a girl, "the walls wept." A cedar tree was planted at the birth of a boy; a pine tree for a girl. The Shema or Psalm XC was read in the presence of the children of the community for the protection of the new-born. There were visitations to the infant boy on the first Sabbath of his life. In Talmudic times, the infant was weighed and its body-weight in coins was given to the poor. Amulets and charms, such as the suspension of Torah scrolls or verses of the Psalms over the bed, or the chalking of circles on the wall or the floor of the lying-in room, were in evidence. The cradle was sometimes hung with bells to ward off evil, a feature of the amulets of modern Spain. The ceremonial of "redemption of the first-born"

came on the thirty-third day after the birth of a male, and the sixtieth day after the birth of a female. The child's hair was not cut until its fourth birthday, lest it acquire an elf-lock. Its religious instruction began in the fourth year. It had to learn the Torah at five, the Mishnah at ten, and "fulfilled the whole Law" at thirteen. Girls as well as boys were sent to the synagogue, where both were kept apart, as showing scant reverence through their playful impulses. Swimming and handicraft were taught, but the Jewish children acquired their games from the people among whom they were living.* The cradle-songs usually enjoin upon the infant that it study the Torah. The following little *berceuse*, translated from the Yiddish in the Jewish Encyclopedia,† has the spirit of "A Child's Garden of Verses," and suggests that bears were fearsome objects to Eastern European children:

> "Beggars and bears are all around;
> They even walk around outside,
> And if they find pretty girls are crying
> They seize them and throw them into the well."

On the day after birth, circumcision was performed upon male children of freemen and slaves, in token of the covenant between God and Abraham. In Biblical times, the operation was performed by the mother, usually with a primitive chipped flint (Exodus, IV, 25). The rite was not in the nature of a sacrament, but was regarded as indispensable to consecration and purification. To be uncircumcised (*arel*) was a reproach, but an uncircumcised Jew still remained a Jew. Aliens had to be circumcised before they could partake of the Passover (Exodus, XII, 48) or marry a Jewish woman (Genesis, XXXIV, 14–16). The rite can be performed by a physician as well as a priest. In the time of Josephus, it was in the hands of a surgeon (*mohel*). The rite of circumcision originated in Egypt. All that came out of Egypt were circumcised (Exodus, IV, 24–26), but those who came out of the Wilderness were not (Joshua, V, 2–9). Circumcision is a widespread custom throughout the Mohammedan world, was probably acquired by the Aztecs by the convection of Egyptian culture (Elliot Smith),‡ is common in Australia, Northern and Central Africa, among the Amazon tribes of South America and the Polynesians of the South Seas. Aboriginally, it is a rite of initiation or consecration of the generative powers at puberty. In the Jewish ritual, it has three stages: the excision of the foreskin (*milah*); the rolling back of the prepuce (*periah*), and the sucking of the wound (*mezizah*), which has sometimes exposed the infant to inoculation with syphilis. The necessity of circumcision in proselytes was abolished in 1892.§

At birth, the Jewish child was washed in water, rubbed with salt, given the breast even before cutting the umbilical cord, and wrapped

* Jewish Encyclopedia, New York, iv (1903), pp. 27–31.

† *Ibid.*, p. 332.

‡ G. Elliot Smith, "The Migrations of Early Culture," Manchester (1915).

§ Jewish Encyclopedia, New York, iv (1903), pp. 92–102.

in swaddling clothes. This procedure, essential in the Talmud, is preserved even in the imprecations of Ezekiel against Jerusalem:

"And as for thy nativity, in the day thou wast born, they navel was not cut, neither wast thou washed in water to supple thee; thou wast not salted at all, nor swaddled at all" (Ezekiel, XVI, 4).

The salting of the child, which was also a custom of the Greeks, was thought to give it a thicker, tighter skin (Galen), with immunity from eruptions. Osiander thought the "salt" was bicarbonate of soda, which forms a soap with the vernix caseosa. In Talmudic times, the new-born infant was also bathed in wine. If it made no sound, it was rubbed with the afterbirth. If the child did not breathe, it was, according to the Babylonian Talmud, swung in a swing, probably the method for relieving asphyxia neonatorum introduced by C. B. Schultze (1871). If it refused the breast, a beaker with hot coals was held near its mouth to stimulate the facial muscles. The swaddling of the child, known as *laphaph* in the Talmud, consisted in compressing its body into a rigid mummy-like mold by a system of tight bandages. The intention was perhaps orthopedic, as the head was also compressed to make it long or round. The mouth was washed to incite vomiting of mucus. In the daytime, the child was rocked in its cradle; at night, it slept with its mother, whence there was danger of suffocation by overlying.

In the third month of pregnancy, it was supposed by the Greeks, the Hebrews and the Arabs that suppression of the menses acquired an economic function; the menstrual blood clouded to become milk. According to Jewish custom, the child was given the maternal breast immediately or within 24 hours after birth, even if the cord had not been cut, which is different from ancient Greek and Indian practice.

The ancient belief that honey purges the new-born of meconium is preserved in Isaiah (VII, 14, 15):

"Behold a virgin shall conceive, and bear a son, and shall call his name Immanuel. Butter and honey shall he eat, that he may know to refuse the evil, and choose the good."

Talmudic theory maintains that the child can suck all day without harm. The night was divided into three watches, and in the third watch, before dawn, the infant was given the breast. The child was suckled for a period of 18 months or two years. In the second book of Macabees (VIII, 27), a mother tells her son that she suckled him for three years. Rabbi Joshua held that breast-nourishment may continue for an unlimited period, even five years, if necessary. Sarah suckled her son Isaac at the age of ninety (Genesis, XXI, 7–8). Breast-nursing was regarded as a primal duty of the mother by the Hebrew prophets:

"Can a woman forget her sucking child, that she should not have compassion on the son of her womb*" (Isaiah, XLIX, 15).

"Even the sea monsters draw out the breast, they give suck to their young ones; the daughter of thy people is become cruel, like the ostriches in the wilderness. The tongue of the sucking child cleaveth to the roof of his mouth for thirst;

the young children ask bread and no man breaketh it unto them" (Lamentations, IV, 3–4).

If the husband of a nursing mother died, she was not allowed to marry again within 18–24 months, lest a new pregnancy interfere with the nourishment of the first child. The time limit for lactation also determined the minimum period within which a widow could marry. If the mother died, the father could provide artificial nourishment for his infant, but these things could not be entrusted to a step-father. The ancients did not credit the theory that lactation hinders conception. The ethical ideal was that specified in Hosea (I, 8):

"Now when she had weaned Loruhamah, she conceived and bare a son."

A rabbi would not allow a widow whose infant had died to marry until 24 months after its birth, because a certain widow had once made away with her child in order to marry earlier. No wife was required to suckle her neighbor's child. If there were twins, one was suckled by a wet-nurse. It was adjudged shameless to suckle infants in public. If a husband forbade his wife to suckle her child, her will and pleasure obtained in the matter, since the labor and trouble were all her own. If she declined to suckle her infant on her own account, the case was decided by the custom obtaining in her family. If the mother was not capable of suckling, on account of sickness or otherwise, a wet-nurse was engaged, usually a slave or hired woman. As in the Alexandrian slave contracts, she was engaged for 2–3 years, undertook no other occupation, and suckled no other child, not even her own. Whether a nurse alien to the Jewish faith could be employed was disputed by the rabbis. She might kill the child by rubbing poison on her breasts. The Jewish women seldom employed alien nurses as their breasts were well developed. When Moses was found by Pharaoh's daughter in the ark of bullrushes, his mother was secured as his wet-nurse by the stratagem of his father's sister (Exodus, II, 7–9). A wet-nurse was held responsible for the fate of the nursling. Like Deborah, the nurse of Rebekah, she was regarded as a member of the family and held in esteem, if competent. During lactation, a nursing woman worked little and fed well. She might take wine, but no articles which might spoil the milk or lessen the supply of it. Hops, green corn, figs, small fish, etc., were interdicted. A supply of "pure unadulterated milk" was specified in the Alexandrian wet-nursing contracts. Both wet-nurses and nursing mothers had to observe the fast-days. There is no mention of artificial feeding in the Talmud. The child must have milk or die. The mother's milk was sometimes milked from the breasts and given in a glass or the horn of an animal, in the case of a new pregnancy. Sucking immediately from the udders of a cow or goat was customary in antiquity, as in the mythological instances of the Egyptian cow-goddess Hathor, or of Zeus and Amalthea, or Romulus and Remus. Suckling from the male breast is recorded in one case in the Talmud. There is no evidence of the existence of nursing bottles, although they were employed in Rome and Alexandria. At the weaning of the child, the Hebrews in the desert

held a feast (Genesis, XXI, 8; I Samuel, I ,24-25). This practice, however, disappeared in Talmudic times.*

Beyond the case of the raising of the widow's son by Elijah (I Kings, XVII, 17–23), the resuscitation of the son of the Shunammite woman by Elisha (II Kings, IV, 18–35), which Preuss surmises to have been a case of sunstroke, and the raising of the daughter of Jairus by Jesus (Matthew, IX, 18, 23–25), there is little mention of children's diseases in the Old or the New Testament. Of the many diseases mentioned in the Talmud, the most dangerous to children was the *askara* (ἐσκάρα) or *serunke* (συνάγχη), that is, *cynanche, squinantia* (quinsy) or diphtheria, identical with the "Egyptian or Syrian ulcer" of Aretaeus. So much was this disease feared by the Hebrews that the first case located in a community was immediately heralded by a warning blast of the trumpet, although the *shofar* was usually sounded, under ordinary circumstances, only after the third case of an epidemic disease. The painful struggling of the suffocating patient was regarded as the most terrible of the 903 known varieties of death. Rabbi Josef said that whoever was guilty of strangling a person to death would either be drowned, strangled by the heathen, or die of *serunke*. Rabbi Ismael ben R. Jose describes the disease as follows:

"*Askara* is a much-dreaded epidemic disease which usually attacks children, is located in the throat, and kills the patient by a painful death from suffocation."

To avert it, there was an apotropaic diet: lentils were eaten daily, all food was salted and water mixed with every drink. Lentils or juice of lentils were recommended as a remedy by Rabbi Jochanan. During the Temple period, the priest on guard fasted every Wednesday to prevent children from catching the disease. In the Karaitic prayer-book, there is the following verse for Wednesday:

"And *askara*, which Thou hast joined to this day: protect the children of Thy people from it, that it may not come into their mouths."

Dysentery (*chôlî mê 'ajîm*) was also much feared, and was doubtless of the tropical variety. Another disease affecting childhood and youth was the *jêrâquôn* (pallid anemia). Heat-stroke in a three-year old boy at harvest time, with cerebral symptoms, has already been noted (II Kings, IV, 18). Biliary disorders (*choli*), jaundice in particular, were common complaints throughout the Jewish and Mohammedan world. They were treated by a mixture of barley, *Carthamus tinctorius*, and salt (Rabbi Josef). This draught, which the Gemara declared to be identical with the Egyptian *zythos*, was called "spear-water" (*mê dequarin*), because it penetrated the bile. Dropsy (*hadrôquan*), intestinal worms (*kinnim*), phthiriasis (*rimmâ*), scorbutic stomatitis (*caphdînâ*) are features of Talmudic medicine. Beautiful teeth and an odorless breath were a personal ambition. *Fœtor ex ore* annulled marriage in a woman, and annuls even a betrothal in Prussian

* These details are derived from J. Preuss: "Biblisch-Talmudische Medizin," Berlin (1911), pp. 466–477; W. Ebstein: "Die Medizin im alten Testament," Stuttgart (1901), pp. 64–67; and Ebstein: "Die Medizin im neuen Testament und im Talmud," Stuttgart (1903), pp. 216–219.

law. The foul breath of the adulteress was an observation of the Talmud (Numeri, r. IX, 21). To keep the breath odorless, *mastix* was chewed, pepper, cinnamon or ginger were held in the mouth, and the teeth were rubbed with a dry powder. Toothache and dental caries were treated by boring, scraping away tartar and implantation of artificial teeth. Gargles were given for tonsillitis and laryngitis (*gârôn*). Milk was drunk frankly from the udders of the goat for lung affections, but there are no words for "cough" or "phthisis" in Hebrew. The arid plains of Palestine were, from of old, inimical to pulmonary disease (Liebermeister).*

HELLAS

In the **Homeric Period** (950 B.C.), infants, when not exposed, were usually nursed by their own mothers. Thus Hecuba reminds Hector how she once gave him "the grief-lulling breast" (*Iliad*, XXII, 82–83); Achilles is described as one "whose mother nurtured him in wrath" (XVI, 203) and there is reference to Penelope as a young bride with "an infant boy at her breast" (*Odyssey*, XI, 448). Among the upper classes, slave-nurses, sometimes captive women, were also employed. Odysseus says to his aged nurse Eurycleia: "Why dost thou wish to destroy me? Thou thyself didst nourish me at thy breast" (XIX, 482), and we learn that Eurycleia had been purchased by Laertes in her youth for a hundred beeves (I, 9), and that she rose to high rank in the household, supervising the fifty female slaves (XXII, 421). The nurse in Homeric life was, like the nurse in "Romeo and Juliet," a member of the family, indeed the general housekeeper. Thus Demeter, in the Homeric hymn (141–144):

> "And truly I could fitly nurse a young infant, having him in my arms, and could take care of the house and could spread my master's bed in the recess of the well-built chambers, and could manage the works of woman."

For such service, as we learn from the same hymn to Demeter (166), even a slave-nurse was richly rewarded. The nurse's duties to the infant were to bathe it in water immediately after birth, to wrap it in swaddling clothes, usually of white, purple or saffron color, with gold bands (Hymn to Apollo, 121), to fondle it and carry it about, and to suckle it until it could be fed on honey or the juice of figs. Care was taken to carry the child until it could stand and walk without distorting its limbs. It was carefully washed and dressed, and cradled in a shield, a shoe-shaped two-handled basket, or in a basket woven of twigs for winnowing corn (λικνόν), which, as being sacred to the gods, was regarded as a symbol of future wealth and prosperity. Dolls, rattles, balls, animals made of clay, and other toys were provided, and stories, designed to form the child's mind, were told, even down to the time of

* J. Preuss: "Biblisch-talmudische Medizin," Berlin (1911), pp. 172–433, *passim*.

Galen (*De temperamentis*, II, 578). As a rule, the nurse remained the devoted attendant of the grown-up son or daughter in after-life.*

As set forth in the laws of Lycurgus (880 B.C.), which are said to have been based upon his observations in Crete, Ionia, and Egypt, the children of **Sparta** were reared in a different manner from that obtaining in the aristocratic milieu of the Iliad and the Odyssey. In Plutarch's life of Lycurgus, we read that eugenics, or the securing of a vigorous parentage to offspring, was practised without any regard for conventional morality; that "children were not so much the property of their parents but of the whole commonwealth"; and that puny, ill-formed children were exposed in a chasm under Mount Taygetus, since it was "neither for the good of the child itself, nor for the public interest that it should be brought up, if it did not, from the very outset, appear made to be healthy and vigorous."

"Upon the same account, the women did not bathe the newborn children with water, as is the custom in all other countries, but with wine, to prove the temper and complexion of their bodies; from a notion they had that epileptic and weakly children waste away upon their being thus bathed, while on the contrary, those of a strong and vigorous habit acquire firmness and get a temper by it, like steel. There was much care and art, too, used by the nurses: They had no swaddling bands; the children grew up free and unconstrained in limb and form, and not dainty and fanciful about their food; not afraid in the dark, or of being left alone; without any peevishness or ill humor or crying. Upon this account, Spartan nurses were often brought up or hired by people of other countries; and it is recorded that she who suckled Alcibiades was a Spartan."†

Up to the age of seven, male children were kept in the gynaeceum under the care of women; from 7 to 18 they were called "boys" (*πρωτείρες* from 18 to 30 "youths" (*ἐφήβοι*), at 30, they attained to manhood. Education of boys was mainly physical—running, leaping, wrestling, boxing, etc., and was conducted in a gymnasium. Dancing, military exercises and the chase made up the rest. At the festival of Diana Orthia, the flogging of certain boys (*διαμαστίγωσις*) was practised to teach endurance to pain. Girls also wrestled, ran races, threw quoits, cast spears and danced in public in a state of nudity; and, as Sudhoff says, "the regulation of sexual life in the gymnastic exercises of girls was divorced from prudery and had a definite eugenic aim: vigorous offspring."‡ Out of this stock came alike the heroes who fought at Thermopylæ, and "Heaven-born Helen, Sparta's queen," whose fatal gift of beauty caused the Trojan war.

In **Hellenistic Athens,** infants were wet-nursed not only by slaves and captives, but also by free women, usually through poverty and the necessity of supporting dependents in this manner. But even when slave-nurses were set free, they still remained in the service of their masters, and like the free-born woman of the metic class,

* These details have been brought together in the graduating dissertation of Sister Mary Rosaria on "The Nurse in Greek Life "(Boston, 1917), an admirable summary.

† Plutarch's Lives (A. H. Clough), *sub voce* "Lycurgus."

‡ Sudhoff: Ann. Med. History, N. Y., i (1917) p. 112; translation of Dr. Frank J. Stockman.

received a living wage. Foreign nurses were sometimes employed by the Athenians. The Spartan women were usually preferred, on account of their robust physique and their sturdy, wholesome natures. Aristotle attributed infantile diseases to faulty diathesis in the nurse (*Historia animalium*, VII, 10). Corinthian and Phrygian women were also favored, and, like all metics, received compensation.* The practice of swaddling the infant continued down to the late Roman period, was described in detail by Soranus, and was carried over into medieval custom. It was derided by Plato, who proposes that nurses should be compelled

"under penalty of a legal fine to be always carrying the children somewhere or other, either in the country, or to the temples, or to their relations' houses, until they are well able to stand and even then they should be careful that their limbs are not distorted by leaning on them when they are too young. They should continue to carry them until the infant has completed its third year" (Laws, IV, 789).

In the same passage he likens the effects of dandling and rocking of infants to the soothing, restful movements of a swing, horseback riding or the sea. Further, he says that nurses judged of the mood of a child by the effect of something offered it: when it is silent, it is pleased; when it weeps and cries out, it is angry (792). The use of wine, by nurse as well as child, was condemned by Aristotle (Politics, VII, 7), and Hippocrates says (*De aere, aquis et locis*, I, 9)† that to avoid the formation of calculus by unwholesome milk, it is better to give children wine copiously diluted with water, as this beverage tends less to burn and dry up the veins. Amulets and charms against witchcraft were still used, and the nurse commonly spat toward an approaching stranger to ward off the evil eye or other malevolent influence (μίασμα) which might emanate from his person. The nurse taught the child to distinguish objects by their names, spanked it with the sandal on occasion (Lucian), and told it the usual nursery tales. To frighten into good behavior, gruesome stories were told about Lamia, the vampire, who devoured children alive, the Gorgon, the minions of Hecate, the Cyclops and other terrifying figures. To amuse children or put them to sleep, mythological stories were told, such as the infancy of Hermes, the adventures of Odysseus or the labors of Hercules. Plato, in the Republic (II, 377–383), Aristotle and Plutarch discourse at great length upon the importance of censoring the episodes in Greek mythology as tales for the young, so that what was immoral and pernicious might be avoided. The Greek lullabies for infants were probably rhythmic songs without words (Aristotle) or with word improvised by the nurse. Beautiful examples are found in the poets, such as the lullaby of Alcmena in Theocritus (XXIV, 6–8), the Lament of Danae in Simonides (Fr. 37), or the nurse's song in the Orestes of Euripides (174–182).‡

* Sister Mary Rosaria, *op. cit.*, pp. 12–15.
† Littré's Hippocrates, ii, p. 41.
‡ Sister Mary Rosaria, *op. cit.*, pp. 34–44.

Over all child-life in Greece, Homeric, Spartan, or Athenian, was the glorious *plein air* of Hellenic culture. Innumerable terra cotta figurines and reliefs exist, representing the suckling, dandling, bathing and fondling of infants, the games of children, and the amulets employed to protect them (Dresden Catalogue, items 4051–4212). Sudhoff summarizes as follows:

"Even though the exposure of weakly or unwelcome children, in Greece (Sparta) and Italy, as well as in the Orient, left an ineradicable stain, yet the Greek upbringing of children, in its harmonious development of body and spirit, is a wonderful phase of hygiene. The love which invested the earliest period of child-life is apparent in the profusion of imagery which tells of the first bath of the new born, its swathing and cradling, the suckling of the infant at the breast of mother or wet-nurse. In the later period of Hellenistic Egypt, infants were in care of wet-nurses, who gave them six months breast-nourishment and eighteen months of artificial milk-diet, as attested by the many nursing bottles which continue to be found in children's graves. The same principles applied to infant nutrition in Confederated Hellas, but the children remained at home in charge of mother or wet-nurses, among whom the Spartan women were particularly prized, although the Spartan habit of rearing without swaddling clothes does not appear to have taken hold elsewhere. In children's games of all kinds, the Greek spirit was everywhere inventive. The plaything was often designed for games of running and jumping; with older children the ball, the hoop, the peg-top were as popular as with adults of both sexes; as also the swing, the see-saw, the kite, the hobby-horse, the go-cart, pitch and toss, etc., which were carried over directly into the gymnastic exercises of later years."*

In Greek medicine before the time of Soranus of Ephesus, the pediatric element is scattered at random through the literature, as with the pediatrics of the Talmud. Greek medicine, as a contribution to science, begins with **Hippocrates** (460–370 B.C.).

A strange superstition of antiquity was to the effect that a seven-months child is sometimes viable, but an eight-months child undergoes certain pathological changes in the uterus, due to sinking and altered relation of the fetus in utero, which renders it unfit for birth and extra-uterine life. A ten-months child was regarded as more vigorous and fit for life than even a nine-months child. Discussion of this matter forms the theme of the Hippocratic treatises on the seven- and eight-months child.

In the Hippocratic canon, there are innumerable references to the hygiene and diseases of infancy and childhood.

Thus in the apocryphal books on Epidemic Diseases (IV–VII) we find cases diagnosed by Littré as opening the chest by cauterization for empyema in a child of Philis (IV, 4); head injury in a son of Metrophantus, with fever, trephining and death on the 24th day (IV, 11); gangrene of the mouth in two children (IV, 19); disease of the bladder in a son of Theophorbus of Larissa (V, 17); fatal impalement of a child by a boar's tusk (V, 39); phagedenic ulcer of the mouth in a son of Athenades (V, 44); fatal tetanus from a sprain in Telephanes, son of Harpalus (V, 75); and from irritation of a wound by a drug in Thrino, son of Damon (V, 76); gangrene of the jaw from toothache, in a child of Metrodorus of Cardia (VI, 100); meningitis from caries of the petrous portion of the mastoid (VII, 5); an epileptic fit in a son of Anechetus (VII, 46); and an umbilical fistula with procidence of the intestine in a child of Dinias of Abdera (VII, 117).

* Sudhoff: Dresden Catalogue (1911), p. 138.

In the genuine books on Epidemic Diseases (I–III), there are authentic and valuable descriptions of the semeiology of phthisis, dysentery and diarrheal diseases, malarial and hæmoglobinuric fevers, gangrenous erysipelas and ergotism, epidemic parotitis and anthrax. In the account of epidemic parotitis in the island of Thrasos, the simultaneous painful swellings in the salivary glands and testicles were already noted, although the orchitis was first featured as such by Hamilton in 1761. The Hippocratic treatise on the joints (*περὶ ἀρθρων*) is a scientific account, almost modern, of the different congenital deformities of the foot and spine and the various dislocations and their treatment. In this treatise (§41), and in the Aphorisms (VI, 46), it is noted that a gibbous spine (Pott's disease) often coexists with tuberculosis of the lungs; and the Calot treatment of spinal deformity by forcible reduction (*redressement forcé*) is applied for the first time (§47). In the treatise on Wounds of the Head (XXIX) Hippocrates says that children die more quickly of wounds than adults.

In the treatise on Prorrhetics (Littré, IX, 52), it is recognized that prolapse of the rectum may accompany obstinate diarrhea or calculus in children. For treatment, it is recommended that the rectum be replaced with soft sponges, the child being suspended with hands tied; or in obstinate cases, moisten the rectum with a sponge sopped in a decoction of lotus (*Celtis australis*, Littré), compressing the rectum by means of a bandage passing around the abdomen and between the legs. At stool, the child sits with its back against its mother's knees, its feet upon her feet.*

In his commentary on the treatise *De morbis* (*περὶ νοῦσων*), Littré (VII, 25–161, *passim*) diagnoses:

Cases of otitis media, otitic abscess of the brain, tonsillitis, inflammation of the tongue, uvula, epiglottis and palate, removal of nasal polypi with a string snare or by cauterization, jaundice, bilious, tertian and quartan fevers, pleurisy, bronchitis, abscess of lung with paracentesis, phthisis and laryngeal phthisis, spermatorrhea (*phthisis dorsalis*), hydrothorax with paracentesis, chronic pneumonia, pulmonary hemorrhage, melena (black vomit), tetanus, ileus, ischias (coxalgia), dropsy, hydatids, hepatitis, splenic disease, renal tuberculosis, rheumatic disorders and scurvy. Any of these may have affected childhood.

"Infantile convulsions supervene," says Hippocrates, "when there is acute fever or constipation, insomnia or sudden fears, or when the child groans, changes color, and the face becomes yellow, livid, or red. These accidents easily affect infants up to the age of seven. Older children and adults are less exposed to convulsions in fever, unless there are such violent and fatal complications as take place in frenzy" (Prognostics §24, Littré, II, 187). In the discourse on the Sacred Disease, epilepsy, which the ancients regarded as due to divine possession, is treated as a cerebral affection due to congestion of cold mucus in the warm blood, unless it is evacuated by ulcers or other channels. Epilepsy, then, attacks such children as have been spared the affections which would relieve them of the slimy material commonly voided in uterine life (Littré, XI, 367).

* T. Kroner: Jahrb. f. Kinderheilk., Leipzig, xi (1877), p. 256.

If it is fear of the divinity that leads adults to seek seclusion in an epileptic fit, children are apparently not so superstitious. They fall where they stand, or if they can perceive the aura from the experience of several attacks, they run in terror to their mothers or to some one they know (*Ibid.*, 383). The presence or possibility of epilepsy in children is known by "sudden distortion of the eyes, by tumors on the neck, or when a grave accident has been sustained or the voice is shrill, or there is chronic cough, or lateral distortion, or varix of internal veins or prolapsed omentum, or an enlarged testicle or a helpless, shrivelled arm, or paralysis of the lower limbs, or if a more mature child feels bodily pain from urethral discomfort. Most people who have care of such children will admit epilepsy; others deny it through ignorance."

Ascarides and tenia are considered in the treatise *De morbis* (IV, 54).

Flat and round worms are held to be engendered in the fœtus. Round worms reproduce themselves; flat worms do not. Hippocrates notes the great increase in size of the tænia—"as long as the intestine itself," in which case parts of it may be voided in the stools or even in walking. If the child is purged without a vermifuge, this will bring away only parts of the worm. The worm is regarded as sometimes impinging against the liver, causing dribbling of saliva, aphonia, jerking sensations in the abdomen and pain.

Cystitis is treated in the Prognostics (19).

Febrile affections of the bladder may cause death, if they persist; there is constipation, or the voiding of hard dejecta on purgation, and purulent urine. If the fever continues, death will supervene in the early stages of the disease, especially in children from 7 to 15 years of age. In the treatise *De morbis* (IV, 55), there is a long discourse on calculus in children, to which Hippocrates devoted particular attention. His views were merely repeated by the later authorities and the Middle Ages added little to the subject (Kroner). In Hippocrates' view, lithiasis in children was due to impure milk. The greater frequency of calculus in boys is noted (Kroner says that 40 per cent. of all cases occur in children under ten, usually boys). Girls are less affected because "they drink more water than boys and the female urethra is shorter and wider." The observation that calculus in boys may be due to mother's milk suggests the exudative diathesis. The formation of sediment from impure urine in the bladder is likened to the settling of sediment in turbid, impure water; the sediment is held to come from a mixture of mucus in the milk with the urine. The five signs of calculus are pain in urination; the emission of urine drop by drop; bloody urine, if the bladder is ulcerated by the stone; inflammation of the bladder with reflex pain at the prepuce; sometimes emission of sand with the urine. In urinary calculus, male infants will handle and rub the genitals; girls do not. For calculus in girls, Hippocrates prescribes a drachm of the leaf of Ethiopian root (*Salvia æthiops*, Littré) in old urine for 10 days, the same in water for 20 days thereafter, and warm baths twice daily.

The treatise on Airs, Waters and Places contains a number of valuable pediatric observations.

In places which are warm, moist and swampy in summer and cold in winter, children will suffer from respiratory disorders, convulsions and a tendency to epilepsy. In places with changeable weather and cold winds, nurslings will get little mother's milk on account of the hardness of the water. Hydrocele is frequent in cold, windy places and disappears in children as they grow. Marshy, stagnant, evil-smelling waters in lakes and ponds produce large, hard (malarial) spleens, stiff, emaciated bellies, with emaciation of the face, shoulders and clavicular region; also fatal dropsies, diarrheas, and prolonged quartan fevers; in winter, there are dropsical, wasted children, with liability to hernia. Pregnancy in warm, changeable winters or in springtime with cold, northerly winds may lead to abortion or to weak, sickly children. The late advent of puberty in cold climates

is noted, also the tendency of Asiatics to deform the infantile cranium by bandages and machines.

A few of the *Aphorisms* bearing on pediatrics may be cited.

"Elderly people bear fasting well; infants poorly, especially those of lively disposition" (I, 13). Galen rightly interprets "fasting" here as "spare diet":

"The growing organism has the most innate (animal) heat and therefore requires more nourishment (I, 14).

"Liquid diet is proper in all febrile diseases, particularly in children (I, 16).

"Treat epilepsy in the young by change of air, environment and mode of life (II, 45).

"Children born in a mild, calm, rainy winter or a cold spring are apt to be puny and unhealthy (III, 12).

"Children are most comfortable and healthy in spring and early summer (III, 18).

"The diseases of new-born infants are aphthæ, vomiting, insomnia, night fears, inflammation of the umbilicus, and discharges from the ears (III, 24).

"At teething, there are pruritus of the gums, convulsions and diarrhea, especially when cutting the canine teeth, and in fat, constipated infants (III, 25).

"A little later. there are tonsillar affections, crick in the neck, asthma, calculus, round worms, warts, scrofula, tumors about the ears and elsewhere (III, 26).

"At the approach of puberty, epistaxis and chronic fevers supervene (III, 27).

"Infantile diseases which do not pass away at puberty become chronic (III, 27).

"Difficult deglutition and suffocation in fever, without swelling of the neck, is a fatal symptom (IV, 34–35).

"Frights or convulsions after sleep are bad symptoms; stoppage of respiration in fevers indicates convulsions (IV, 67–68).

"Epilepsy before puberty may change for the better; after 25 it is usually fatal (V, 7).

"Rolling of the eyes in sleep is bad, unless connected with loose bowels (VI, 52).

"Acid eructations in diarrhea are of good omen (VI, 1).

"Those who acquire humped backs from asthma or cough before puberty will die" (VI, 46).

With Hippocrates, Greek pediatrics, in the proper sense of the term, culminates and ends.* After the destruction of Corinth (146 B.C.) Greek medicine was transplanted to Rome, and its greatest representatives in Rome came, not from Athens, Corinth or Thebes, but from the peninsula of Asia Minor.

ROME

From Rome came the first laws for the protection of children, but there was to be a long struggle with infanticide, the systematic destruction of female infants and the inhumanities of the *patria potestas*. "The Roman policy," says Lecky, "was always to encourage, while the Greek policy was always to restrain population, and infanticide never appears to have been common in Rome till the corrupt and sensual days of the Empire."† According to legendary tradition, Romulus, the founder of Rome, who had been an exposed infant

* For a study of the pediatrics of Hippocrates as compared with the views of modern writers, see J. W. Troitzky: "Hippocrates als Kinderarzt," Arch. f. Kinderheilk., Stuttgart, xxix (1900), pp. 223–247.

† Lecky: "History of European Morals," New York, ii (1869), pp. 28–29.

himself, decreed that all male infants who were not monsters or otherwise malformed were to be reared, as also the first born of all female infants. The object of this ruling was to breed a warlike race, with a superabundance of males as soldiers. Even the Roman census of population was centered on estimating the fighting strength of the nation. To Numa Pompilius (715–673 B.C.) is ascribed the law cited in Justinian as *lex regia de mortuo inferendo*, which decreed that a woman who had died in pregnancy should not be buried until the child had been excised from her body, lest the hope of the living perish in the grave. From the "sombre Puritanical Sabine" came another feature of early Roman law which was to react against youthful freedom with frightful force, namely that part of the *Jus Quiritium* which made chattels of wives and children, so that a father could sell, mutilate or even kill his own offspring at will (*patria potestas*). Numa Pompilius, with the idea of encouraging marriage in young people, amended this hard rule to the extent that a father lost the power to sell his son when the latter obtained consent to marry. Under the Roman Republic (509 B.C.) the *patria potestas* continued in full force. In the Laws of the Twelve Tables it is stated that a son went free after being sold three times by his father. The exposure of infants is a common dramatic motive in the comedies of Plautus and Terence.

In the best days of the Roman Republic, private life, particularly married life, was sacred, and there was even a tax on bachelors. In the last days of the Republic, depravity was rampant everywhere, celibacy, divorce and abortion were frequent and unwelcome children were thrown into the Tiber. To encourage marriage and increase the population Augustus Cæsar proposed the *lex Julia* (adopted 4 A.D.) and the *lex Papia*, which put a check upon the abuses of the *patria potestas*.* Celibates were not permitted to inherit, and a childless husband could inherit only one half of property or of moneys willed to him. In candidacy for office, preference was given to the father of the largest family; fathers of three or more children were relieved from taxes, and the senior of the two consuls was held to be he who had the greater number of children. Anyone who reared an orphan was rewarded. Through these laws, children acquired a new importance by conferring rights and privileges upon the father, and the people, as inheritors of the childless acquired, in the phrase of Tacitus, the fictitious title of "universal parent." Yet the great historian says that, "to enforce this regulation, informers were encouraged. The genius of these men knew no bounds: they harassed the city of Rome and stretched their harpy-hands all over Italy. Wherever they found a citizen, they found a man to be plundered." This attempt at regulating the population by paternal government could not thrive. Celibacy continued popular, and, in spite of subsequent relief from espionage, these laws were abolished by Caracalla and Constantine. Gibbon begins his "Decline and Fall" with a memorable eulogy of the

* Payne, *op. cit.*, pp. 223–235.

reigns of Nerva, Trajan, Hadrian and the two Antonines as the happiest and most prosperous period in all Roman history. Payne calls these rulers the "emperors of the children." In the reign of Nerva, there was an attempt to diminish the **exposure and drowning of infants** by founding colonies for poor families and assisting indigent parents (97 A.D.). This philanthropy was furthered by Trajan, and in 100 A.D., some 5,000 children were cared for by the State. A Roman coin represents Nerva dispensing charity to children with the inscription "Tutela Italia." The younger Pliny settled 500,000 sesterces on the city of Como for the maintenance of children of good families, and a tablet of the Ligurian town of Velia shows that the interest on land mortgages went to the support of poor children (Payne). Hadrian (117–138 A.D.) decreed that the child of a woman freed during pregnancy should be free, that a woman might make her will and that a free woman could inherit if she had children, or a freed woman if she had four, and that Carthaginian priests were to be crucified for sacrificing children to Moloch. He virtually abolished the *patria potestas* by deporting a father who had killed his son, and by compelling parents to rear their children instead of exposing them. The mutilation of exposed slave children in order to make them objects of charity was a great abuse of the time, and was justified by the philosophers as better than letting them die. But laws had now passed, as a "Perpetual Edict," into the hands of learned jurists and could no longer be changed by the caprices of emperors. Thus Justinian harks back to a rescript of Hadrian declaring the sale of children to be illicit and dishonest. Antoninus Pius (138–161 A.D.) gave to children the right to inherit from their parents and founded, in honor of the empress Faustina, the first institution for the protection of girls. This institution, which is commemorated in a Roman coin, was the first foundation designed to save female infants from destruction. Other endowments against infanticide grew apace. Marcus Aurelius (161–180 A.D.) abolished the paternal power of compelling the son to divorce his wife, and placed the alimentary institution of Antoninus Pius under the supervision of a praetorian of consular rank. These great benignant emperors were followed by a succession of bloody tyrants. Infanticide and exposure increased as poverty increased. Moved by the pleadings of Lactantius, Constantine issued an edict to all Italy and Roman Africa ordering that magistrates give immediate, necessary, and sufficient aid to indigent parents (May 12, 315 A.D.), and in order to save abandoned infants from death by exposure, declared all foundlings to be the slaves of those who chose to rear them, punished parents who exposed their offspring, and gave poor parents again the right to sell their new-born infants. The last edict bearing upon this subject before the fall of the Roman Empire was that of Valentinian, Valens and Gracian, punishing a parent for the exposure of his children (Payne).*

* Payne, *op. cit.*, pp. 236–256.

GREEK MEDICINE IN ROME

Of the Greek physicians after Hippocrates, those who are to our purpose—Aretæus, Soranus of Ephesus and Galen—came, not from Athens, Corinth or Thebes, but from Asia Minor. The only Roman contribution to medicine of importance is **Celsus,** which, as indicated by the researches of Max Wellmann, is a compilation or translation from many Greek sources, in particular of the Greek medical handbook compiled by Cassius Felix, the body physician to Tiberius Cæsar (*ante* 26 A.D.).

Celsus says that children are healthiest in spring and early summer, young people in winter. The diseases of infancy are apthæ, vomiting, night vigils, discharges from the ears and inflammation about the umbilicus; at teething, there are ulcerations of the canine gums, convulsions, slight fevers, diarrhea, particularly during eruption of the canine teeth. A little later, there may be glandular tumors, spinal curvature, struma, and painful warts (*achordonas*); at puberty, lengthy fevers and epistaxis. All children are in greatest danger up to the fortieth day, or in the seventh month, the seventh year, or at puberty. Infantile diseases, therefore, which do not disappear at puberty are apt to continue for a long time. Youth is most exposed to acute diseases, epilepsy, insanity and consumption, usually with hæmoptysis. A strong point made by Celsus is that "*children should not be treated as adults.*" Venesection, purgation and administration of wine should be avoided in weaklings, and care should be taken not to expose the child to wakefulness, hunger or thirst. In the pestilential fevers, cupping should be employed in children not strong enough to bear venesection, a light diet should be given, with enemata of water or a decoction of pounded barley. The anginas should be relieved by bloodletting, purgation, cupping about the throat, moist fomentations, gargles of hyssop, catmint, thyme, wormwood, bran or dried figs in hydromel, inunction of the palate with ox-gall or powdering it with pollen of pepper; finally, free incisions may be made at need under the mandibles, in the palate, about the uvula or in the sublingual veins. Aphthæ, when they spread from the gums to the palate, uvula and fauces, are apt to kill children. When they affect sucklings, the nurse should exercise her body, bathe frequently and foment the breasts with hot water; if the child has fever, she must diet and drink plenty of water, otherwise light wine; she must purge herself, if constipated, or procure emesis, if she has phlegm in her throat. The ulcers should be anointed with honey and Syrian rhus (sumach), or bitter almonds; or with dry rose leaves, pine kernels and small mint stalks incorporated with honey; or with mulberry juice boiled with equal parts of saffron, myrrh, alum, wine and honey, as gargles. If gargles fail, caustics (alum, chalcitis, copper sulphate) may be used with light diet. Cheese and honey cleans the ulcers. For discharges from the ears, puncture with a hot needle is recommended (VII, 8). In umbilical hernia,* avoid operation and employ fasting, purgation or an application of a mixture of hemlock, soot, washed ceruse, washed lead, two eggs and the juice of nightshade. This poultice should be kept on for a considerable while; in the diet, anything causing flatulence should be avoided. In infantile hydrocele, the tumor diminishes during fasting or a slight fever (VII, 18). In infantile hernia, the application of a bandage will often bring about reduction without recourse to the knife (VII, 20). Operations for phimosis and paraphimosis are described, also infibulation in boys "for preserving their voices" (VII, 25). The surgical treatment of varicocele (*ramex*) is also given (VII, 22).

The *De rerum natura* (I, 936–942) of Lucretius (98–55 B.C.) contains some admirable verses, showing how the Roman physician of the period

* Hernia, known to the ancient Romans as *crepatura* and *ruptura*, was first called by its present name in Martial and Arnobius (Hyrtl).

smeared honey around the rim of a bowl to disguise the taste of wormwood administered to a child, a device which was doubtless derived from Greek practice.

In the treatise on acute and chronic diseases of **Aretæus** the Cappadocian (2–3 Century A.D.), which, according to Max Wellmann, really derives from Archigenes (1st Century A.D.), diphtheria (*ulcera Syriaca sive Ægyptica*), pneumonia, epilepsy, cholera infantum, colic and other diseases affecting childhood are described in classic style. Tetanus in children is mentioned for the first time.

"Children are frequently attacked by it, but do not often die, because the affection is familiar and akin to them; striplings are less liable to suffer from it, but more readily die." Children usually suffer from aphthæ until puberty; "for children, in particular, have large and cold respiration, there is more heat in them, moreover they are intemperate in diet, have a longing for varied food and cold drink, and they bawl loudly both in anger and sport; and these diseases are familiar to girls until they have their menstrual purgation." Cholera attacks children frequently, but is not usually fatal. Ileus "is common in children who are subject to indigestion and they more readily escape from mischief, owing to their habits and the humidity of their intestines, for they are loose." Children with coughs, even youths, are apt to weather phthisis. In the young, stone usually form in the bladder; in the aged in the kidneys. Cachexia, jaundice and swelling of the spleen are common to childhood and youth, but are seldom fatal. "Children are subject to continued diarrhea, from an ephemeral intemperance of food, but in their case, the disease is not seated in the cavity of the stomach. Diarrhea attacks children and adolescents; dysentery, adults. Children are also subject to anasarca and leucophlegmata. The bad effects of gonorrhea in young persons are noted." Milk is the best remedy for marasmus and the induction of vomiting is beneficial in epilepsy.

The gynecological treatise of **Soranus** of Ephesus (2nd Century, A.D.) gives the most remarkable and complete account of pediatrics in antiquity.* It consists of 23 chapters dealing with the birth, washing, swathing, and nutrition of the infant, the choice and regimen of the nurse, the weaning of the child, teething, tonsillitis, aphthæ, skin eruptions and pruritus, catarrh and coughing, brain fever (meningitis?) and diarrhea. The salient characteristics of Soranus, which set him quite apart as a great physician, are a highly critical spirit, rational scepticism and scant reverence for the authority of the past.

If the new-born child is fit to survive, the mother must have been strong and healthy during pregnancy, the infant should cry and kick vigorously when laid down and should have no apparent bodily defects or abnormities. The cord should be severed, preferably with a sharp knife, and the stump ligated. The Germanic and Scythian custom of plunging the child in cold water after omphalotomy, in order to harden it or test its endurance, is strongly condemned, as also washing the child in brine, wine, or urine, or sprinkling it with powder of myrtles or nut galls. Even exposure to the air, for cooling, is bad. Salting the child is, however, still recommended. The crude Thessalian mode of swaddling recommended by Antigenes is condemned, and a rational routine is described at length, with special regard to gentleness of procedure. The barbarous Thracian and Macedonian custom of binding the child to a hard flat board is to be avoided, and a wooded pallet or a straw mattress, neither too hard nor too soft is to be chosen,

* For a German translation of which, see "Die Gynäkologie (περὶ γυναικείων) des Soranus von Ephesus," übersetzt von H. Lüneberg, Munich, J. F. Lehmann (1914), pp. 56–92.

with careful attention to the posture of the child. A clean, moderately warm room, avoidance of draughts and excess of light, and a mosquito netting for the infant's bed, are recommended. If the child shows no signs of hunger, it should receive no nourishment, but be moved about continually for the first two days. If it cries for food, honey, moderately stewed, is preferable to indigestible butter, abrotanum with butter, nasturtium or barley flour. Mother's milk is held to be valueless for the first twenty days, as being thick, cheesy and indigestible. Honey, sometimes mixed with goat's milk, is kept up for the first three days (sugar diarrhea), and the mother's breast must first be sucked by another infant before it is given to the new-born. If the mother's milk is not of the proper consistency, a professional wet-nurse is to be preferred. Soranus actually maintains that the mother should save her strength for future childbearing and that the child will thrive better on the milk of a stranger. His directions for the choice of a wet-nurse, her diet and mode of life, the testing of her milk, are given at great length and are similar to those of the Indian cult. The finger-nail test for consistency of the milk—whether it spreads gradually over the nail or a laurel-leaf, separating into drops on shaking, or flows thinly, or is viscous—and the water test, its preservation of its color in twice the amount of water, are here specified for the first time. Multiparæ are preferable as wet-nurses to primiparæ, on account of the inexperience of the latter, and large, robust, matronly nurses to small or attenuated. Greek nurses are recommended that the child may become early accustomed to "the most beautiful of all languages." Too much bathing, and bathing in hot water, debilitates the child. Bathing should be done in the day time, never at night, and then only after evacuation of the bowels or for skin rashes. The water should be warm, and the child accustomed, day by day, to colder baths. The directions for wiping, rubbing, salving and swathing are very minute. The subsequent suckling should be discreet and not excessive; the child must not be suckled every time it cries; other causes than hunger should be sought, if it cries continually. The child should not be rocked or otherwise shaken up after breast-feeding, as the effect is like that of sea-sickness. The swaddling clothes may be gradually removed in 40–60 days after birth. If the child tries to sit up or stand, it should be supported to avoid deformation of the spine or lower limbs. Soranus notes that these matters were neglected by the Roman dames, who lacked the warmth of sympathy with children which Greek women possessed. Soranus' observation of the frequency of crooked limbs in Roman children is regarded by Wilhelm Ebstein as evidence of infantile rickets in antiquity.* The child should not be weaned, for any reason, until it is strong enough to take solid food, usually not less than six months after birth. Then bread crumbs, softened in honey-water, milk, sweet wine or honey-wine may be given. Thereupon a soup of coarsely ground husked wheat, a thin brew and soft-boiled eggs may be tried, but no milk should be given during this repast, as the mixture is indigestible. Thirst should be allayed by water or thinly diluted wine, given by an artificial nipple. Nothing to be chewed should be given at first, and the addition of roots, poppy-seeds and sesame should be avoided. Complete weaning should come to pass at the eruption of the teeth, that is 1½–2 years after birth. Abrupt weaning by means of bitter or malodorous applications to the breasts is bad for the infantile stomach. Spring is the best time for weaning, autumn the worst, on account of its uneven temperature. The view of Mnesitheus and Aristanax that girls should be weaned six months later than boys is condemned, since girls are not weaker, as these writers maintain, but of stronger and fuller habit of body than boys. The child must be early accustomed to all good food staples after weaning, but if too fat, its diet must be restricted, and if it is gluttonous, this must be accomplished by diverting its attention with play. If it tends to reject food, its appetite must be whetted by variety. In sickness after weaning, milk diet must be resumed until

* W. Ebstein. Virchow's Arch., Berlin, cxciii (1908), pp. 522–524. Ebstein speaks (p. 520) of an infantile skeleton of the end of the 1st Century A.D. (just before Soranus), excavated at Centirupe and now in the Museum at Syracuse, showing indubitable signs of infantile rickets.

health is restored. Teething sets in about the seventh month, and then irritation of the gums by chewing must be avoided. Before teething, the gums should be gently rubbed with oil or fats, and the child may be permitted to suck fat bacon without swallowing it, but this should cease when the teeth appear. The gums should not be irritated by butter or acid substances, and if there is much inflammation, poulticing and sponging are recommended. In tonsillitis, honey water and barley brew may be introduced, and all sources of congestion, such as the custom of turning the child upside down seven times, are pernicious. In aphthæ, the mouth may be anointed with honey, in mild cases, or with moist astringent applications (lentils and pomegranates) where the mouth is hot and dry; internally, fresh or pressed rose-leaves or cyprus or tamarisks. Mouth-washes of mulberries, poppies and plantains in honey, iris salves with honey, or any astringent decoction cooked in honey, or powders of rose-leaves, saffron, myrrh, nut-galls, juniper, moistened with honey, or any of these mixtures with the juice of sweet pomegranates are recommended. Removal of the scurf with the finger, a custom of Syrian nurses, is bad practice. Pruritus is treated by fomentations and applications of oily salves, with a slight admixture of wax, that they may cling to the body; skin rashes and ulcers should never be treated with salt water or urine; they should be let alone until it is necessary to apply decoctions of roses or lentils or astringent applications of myrtle,. mastix, blackberries or pomegranates, etc. Inflamed ulcers after evacuation of pus are treated by similar applications. Irritating remedies are to be avoided in catarrh and coughs; honey may be trickled into the mouth or the phlegm evacuated by inducing vomiting; in attacks of coughing, dainties such as pine-kernels, roasted almonds, linseed, licorice, gouts' thorn and honey are best, and bathing is interdicted. Siriasis, an inflammation of the brain and its membranes, with sunken fontanelles, sunken eyes, pallor, dryness and loss of appetite, is treated by applying to the temples a mixture of rose oil and yolk of egg, or of heliotrope leaves, pumpkin chopped fine, cucumber rind, or of rose oil and nightshade juice. Infantile diarrhea is treated by injecting plantain juice with an aural syringe, or if the child is still taking the breast, by giving astringents to the nurse; constipation by giving laxatives to the nurse. If the child has been weaned, the same remedies may be given directly. Atresia ani is remedied by dilatation with the finger or by perforation.

The *Noctes Atticae* of Aulus Gellius (2nd century A.D.), known to Latinists as a repository of curious facts about antiquity, contains some striking passages about the care of infants, in which the ideas of Soranus about breast-feeding are reflected.

Galen (131–201 A.D.) gives a long series of controversies on the viability of the seven- and eight-months child, with much admixture of astrology; opposes the German and Scythian custom of immersing the newborn in cold water for purpose of hardening; indulges in much casuistry about infant nutrition, warns against nursing the child before its bath or during the bath, and is generally at one with Soranus in regard to the regimen of infant-life.

He mentions congenital atresia of the urethra, recommends a plaster bandage for paraphimosis, defines hydrocele, hermaphroditism, hydrocephalus, exomphalos (prominent umbilicus), epiploomphalos (omental prolapse into the umbilicus), enteromphalos (intestinal prolapse) and hydromphalos (water in the umbilicus); gives directions for the physical and mental regimen of epileptic children; describes white, red and black aphthæ, differentiates between round worms, ascarides, and tenia, and recommends verbena (*heria*) and helenium for ascarides; he mentions the frequency of hiccough in children and ascribes it to the "corruption" of too solid food in the body from overeating or to catching cold; he defines three kinds of intermittent fevers, *viz.*, the quotidian (from putrid phlegm), the tertian (from excess of yellow bile), and quartan (from excess of black bile) and regards the

quotidian as peculiar to children. He describes asthma, in connection with goitre, as a painless glandular (thymus) swelling peculiar to the neck. In his treatise *De morborum causis* (ed. Kühn, 1824, VII, 27), Galen gives an account of infantile rickets.*

Caelius Aurelianus (5th Century A.D.) is, apart from Celsus, the only Roman writer who contributed anything of note to pediatrics.

He regards epilepsy as a *passio puerilis*, frequently associated with teething thus confusing it with infantile convulsions. For treatment, the child is covered with a cloth and warmed by rubbing with oil, while honey is sparingly trickled into its mouth, and goat's milk is given if the child cannot take the breast. If it can suckle, the breast is smeared with honey. The child should be carefully guarded against fright, irritation and excitement, and if the nurse is epileptic, she must be discharged. He describes an "ignis sacer" covering the neck and chest in inflammatory angina, which was probably scarlatina (Kroner). He gives a good account of the symptoms of intestinal worms. The child groans in its sleep, rolls about, gnashes its teeth, tends to lie prone, cries out suddenly, or falls silent, is seized with convulsions, sometimes becomes somnolent, the face becomes emaciated and loses its color; the child gets cold and answers questions with difficulty; sometimes throws itself about with outstretched hands, working itself into perspiration. The worms may even be felt in the thinnest parts of the intestines. The pulse, as Themison says, is irregular and often deficient. The worms sometimes come out of the nose and mouth, as well as the rectum. To remove them, three or four pills the size of a bean in warm water, or "chamelaeæ" rubbed in honey-wine are recommended. Asthma is described as a disease peculiar to children and old people, more frequent in the weak than in the strong, occurring oftener at night than by day, in winter than in summer with a feeling of suffocation, hissing respiration and lividity of the lips.†

BYZANTIUM

(476–732 A.D.)

The rôle of Byzantium in the history of medicine was that of an embalming medium or cold storage plant for the accumulated knowledge of the past. Byzantium was, in Allbutt's phrase, a citadel of "culture," with all the untoward associations which have latterly attached to the term. Church and State were supreme, upheld by laws as rigid as the grip of a vice. An absolutist theory of existence prevailed, with definite aversion to freedom of thought and action. The adjective "Byzantine" connotes architecture of wonderfully massive, ornate type, splendor of raiment, decoration and creature comforts, abounding luxury, licentiousness and with it, an effemination or eviration of character, which, in the end, made the population of the great city powerless to protect themselves from invasion. People were probably no worse then than they are now in overcrowded communities, but their life-lines were mapped out for them in advance, and virtue, knowledge and talent were as nothing in the scale with consistent subservience to authority. In the many histories of

* Delpeuch, Presse méd., Paris (1900), p. 383. W. Ebstein, Virchow's Arch., Berlin, cxciii (1908), pp. 524–528.

† For an exhaustive study of Greek pediatrics, arranged by diseases, see T. Kroner, Jahrb. f. Kinderheilk., Leipzig, N. Y., x (1876), p. 340; xi (1877), p. 83; 236.

Byzantium, we hear little of the children, except that "their education tended to keep them all in a definite groove" (Finlay). "In place of Augustus," says Allbutt,

"came a kind of Sultan, wearing that oriental diadem, the mere dread of which had brought Caesar to his end; the Emperor was approached with adoration as a living god, and lawyers buttressed his throne with an absolutist theory of the constitution which was universally accepted. . . . But the price was a heavy one; the heirlooms of the past were carried into fortress, and for a millenium were immured in a sumptuous, almost a spellbound treasure house. The calcareous shell was of mother of pearl; the walls and towers of the casket shone in the sun with such splendor as Jeremy Taylor conceived of the Kingdom of Heaven. Exalted in the wilderness of Europe, shining like a sun, radiant with gold and gems, pompous with priests and men of war, Byzantium guarded the precious germs of which a new world was in due time to be born. But meanwhile this very pomp which, to the hordes which beset it, made it seem invulnerable, stiffened the sinews of the defenders. In their serried regiment there was no play for personal freedom, no play for varieties of temperament or diversities of creed. A rigid uniformity of array, an absolute subordination of rank to rank, an unbending orthodoxy of belief were the cement of the fortress, the conditions of its solidity and immunity, and the protection of its sacred store. We shall anticipate, then, that within its walls there would be no expansion, no breathing of the human spirit, but the immobility of a great rock, the silent watch of its sentinels, the enslavement of the poor and the needy, and the bondage of the human mind . . . Heresies were persecuted not as religious but as political perils. Unfortunately in this, as in too many other periods in the world's history, machinery, when it has served its purpose, is not scrapped in due time, but endures to the stifling of young ideas and the bondage of young limbs."*

The Byzantine Empire lasted until 1453, surviving even the invention of printing, but it never attained to the multiform life of the later Middle Ages. As Hirschberg says, it merely went on marking time in the past.

Among the later Greek and Roman writers, beginning with Galen and Celsus, there had arisen a custom which was to be the fashion in medical literature for over a thousand years, namely the attempt to summarize all extant medical knowledge into one massive treatise. This was to be as characteristic of Bartholomæus *Anglicus* as of Pliny, of Niccoló Falcucci as of Galen or Avicenna. Of the great compilers of Byzantium, only three need concern us, Oribasius (325–403 A.D.), Aetius of Amida (6th Century, A.D.) and Paul of Ægina (625–690 A.D.). The works of these men are wonderful and even fascinating summaries of the medical writings of antiquity. Their pediatric lore is considerable.

Oribasius (325–403 A.D.) gives Aristotle's lost observations on the eight-month's child, and long chapters (Daremberg's Oribasius, III, 117–182) on the rearing of infants, the choice of a nurse, the quality of milk, the education of a child up to 14 and after, and the regimen of childhood according to Mnesitheus, Rufus of Ephesus, Athenæus and Diocles.

He cites the recipe of Mnesitheus for "rheuma of the brain" (cold in the head): Do not anoint with honey, but bathe the child in a warm bath, pouring hot

* Sir T. C. Allbutt, Byzantine Medicine (Finlayson Lecture), Glasgow Med. Jour., lxxx (1913), 4 s., p. 323.

water on its head, and making it eat much honey; then induce vomiting by tickling the throat, in order to void the phlegm. Meat is bad for infants, also thick soups, as creating phlegm. Honey is the natural first food: its sweetness is attractive and it purges the intestines of meconium (Rufus of Ephesus). It is very bad for the nurse to eat celery, mint, or garlic, as affecting the milk and inducing epilepsy and pustules in the child. Children born thin are apt to take on flesh because they need it, while those born fat, with rosy cheeks, usually get thin later, because puffy children need evacuation. Never frighten infants, as it may lead to infantile convulsions or epilepsy. Never bleed children under 14. Congenital hypospadias, with the urethal opening in the lower surface, also epispadias, are described at length, with surgical treatment. Antyllus' account of phimosis, paraphimosis, and dislocated phimosis is preserved in Oribasius. Three varieties of hydrocephalus (between the skin and pericranium, between pericranium and cranium, between cranium and the cerebral membranes) are described in great detail. The observations of Galen and Archigenes on white, red and black aphthæ and their frequency in Egypt recur in the Byzantine compilation, and erysipelas is again mentioned. Skin eruptions from perspiration and other causes are enumerated among children's diseases and are also ascribed to unwholesome milk or contagion from the maternal parts at birth. Diaphoretic remedies are prescribed for the wet-nurse. The directions for the education of children in Oribasius are refreshingly modern in spirit. In the seventh or eighth year boys and girls should be confined to genial, humane tutors, whose encouraging praise and pleasant flow of language will inspire them to excel. A generous diet, too, must not be forgotten (modern school-lunches for children). Bitterly censorious teachers who obstinately uphold their authority everywhere, will only make slavish, cringing, fearful pupils, disgusting them with the objects of instruction. How can it be otherwise, he says, when the child, which loses its presence of mind when beaten, is yet required to learn and memorize what it learns? Children who are tormented with instruction all day, and not allowed to play, are in exactly the same class with servants, who break down from unintermitting labor without recreation. At twelve, languages and the mathematics should be begun, with bodily exercise under experienced instructors, who know the right measure and the right time for eating, gymnastics, bathing and sleep. Most people will engage thoughtful or experienced men to look after their stables, at a liberal salary, while they entrust their children to inexperienced teachers, usually ignorant persons who have already failed in life.

There is much sound pediatrics in the huge "Tetrabiblion" of Aetius of Amida, who was royal physician to Justinian I (527–565 A.D.) and lord high chamberlain at the Byzantine Court.

Lingual adhesion is described as a common abnormity, with semeiology; the acquired form is usually due to hard sublingual ulcers and cicatrices. Movement of the tongue and sucking the breast are difficult, speech comes late, and words containing the letters R, L and K are difficult to pronounce. An operation for severing the frenulum is given. Ranula (*ranunculus*) is described as a sublingual tumor, usually affecting the veins. Acquired umbilical hernia, from distension of the abdomen by faulty diet and flatulent colic, is clearly recognized. The symptoms of tonsillitis are: marked fever, difficult swallowing, constipation, increase of pain in the evening, pain in the ears, difficult breathing. Gargles, liquid and semi-solid foods and blood-letting are prescribed, and, if there is suppuration, an Egyptian salve of resin with turpentine, honey and sweet oil. There is some evidence that Aetius knew of the scarlatinal anginas. Incontinence of urine is differentiated as either continual and dribbling or occasional and nocturnal. The former is attributed to paralysis of the sphincter of the bladder. Drinking water in the evening and irritating applications to the parts are forbidden. Hiccough, from hasty suckling or from cold by wetting the clothes, is treated by caraway seed, acidum scyllinium, holding the breath, production of sneezing, elevating the extremities and bringing them together, and cold. Otitis is treated

by trickling in albumen mixed with human milk; aural discharges by irrigating the ear with alum and wine and plugging it with soft wool. Eczemata are defined as painful, non-purulent pustules, resulting from heat and perspiration. Herpes is ascribed to accumulation of yellow bile in the locality affected. If it collects in quantity with ulceration of the whole skin, it is "herpes exedens."

Alexander Trallianus (525–606) left a treatise on intestinal worms, which was translated into Latin by Hieronymus Mercurialis (Venice, 1570) and subsequently incorporated in his pediatric treatise (1583).

Paul of Ægina (625–690), the last of the great Byzantine compilers, begins his Epitome with a series of compact chapters on the complaints of pregnancy, the wet-nurse, the milk, how to correct bad qualities of milk, the management of infancy, infantile eruptions, cough and defluxion, pruritus, dentition, aphthæ, excoriations of the thighs, discharges from the ears, siriasis, the regimen of childhood and youth, exercise, the kinds of friction, vociferation or exercise of the voice, constriction of the skin and lassitude. Whoever wishes to gain a bird's eye view of pediatrics from classical antiquity to the late Renaissance period, will do well to read these terse chapters in the English version of Francis Adams of Banchory, with his scholarly and illuminating commentaries. Much of the Pauline pediatrics is taken from Oribasius, going back from Oribasius to Galen, Soranus, and their predecessors, while the same material was copied and carried forward in a monotonous, almost mechanical, way by Rhazes, Haly Abbas, Avicenna, Bagellardo, Metlinger and the later Renaissance writers. Oribasius and Paul are, in fact, half-way houses between remote antiquity and such pediatrists of newer stamp, as Walter Harris or Underwood. The old thumb-nail and rennet tests for nurses' milk, for instance, which originated with Soranus, were passed on by Oribasius and Paul to author after author, long after Soranus and the Byzantines, who cribbed his material, had been forgotten. The vegetable remedies for infantile disorders proposed by Oribasius and Paul were enormously multiplied, for each disease, by the drug-fancies of the Arabian physicians.

Paul describes ranula (ranunculus) as an inflammatory sub-lingual tumor, usually occurring in childhood (III, 26). To Soranus' treatment of imperforate anus, he adds excision of the occluding membrane with the scalpel, irrigating the wound with wine (a common procedure in the mediæval treatment of wounds). Atresia of the pudenda, atresia vaginæ and imperforate hymen are clearly differentiated (VI, 72), with directions for exploration with an instrument, incision or excision with a fistula-scalpel, and plugging of the vagina with a tent of charpie. Three kinds of hermaphrodism (after Leonides) are noted in males, and one in females (IX, 69). In the extensive chapter on ophthalmology, congenital strabismus is described for the first time as a spasmodic affection of the muscles moving the eye (III, 22). The squint is remedied by a visor-mask, compelling the child to look straight forward. This was afterward figured in the illustrated ophthalmological treatise of George Bartisch (Dresden, 1583). A lamp is placed opposite the mask, so as not to shine obliquely; then the eye is turned to the nose; purple flocks of wool should be fastened to the outer angle of one eye, so that by looking at them steadily, the patients may correct the state of vision." Eczemata and impetigo in children are mentioned (IV, 3) and an attempt is made to differentiate between the splotches of leprosy and those of psoriasis.

In the Byzantine Period, the early Fathers of the Christian Church concerned themselves not a little with medicine. Tertullian surpassed all others in his scientific and medical knowledge. (Harnack).

In support of the Christian doctrine that even the unborn child is endowed with a soul, he speaks of the "unconscious intelligence" of climbing plants, and maintains that even the crying of the child shows its consciousness of birth into life. "It recognizes mother, nurse and wet-nurse by their breasts, rejects an unfamiliar breast, dislikes a strange bed, and will only go to persons whom it knows." Development depends upon environment and education. Dull, stupid people come out of Thebes, the Athenians are the cleverest in thought and speech, and in the precinct of Colyttus, where Plato was born, children learn to speak a month earlier than is usual. The soul originates with generation of the fœtal body, as pregnant women know, for still-born children are evidence that life was once in them. In this doctrine, the soul is actually generated at impregnation and unfolds itself at puberty, an argument which was the mainstay of Christian antagonism to abortion and infanticide. Craniotomy and dismemberment of the fetus to save the mother's life are attacked for the first time in the writings of Tertullian. Eusebius (302 A.D.), Gregory of Tours (581) and Marius, Bishop of Avenches (570) described epidemics of small-pox, which was first called *variola* by Marius. Diphtheria is called "*esquinancie*" (*cynanche*) in the Chronicle of St. Denis (580), and Roman epidemics of 856 and 1004 were described by Baronius, and, in Byzantium (1039) by Cedrenus. In the 5th century, A.D., the German barbarians designated crooked limbs as "*krump,*" and humped backs as "*hover;*" the Anglo-Saxons called the rhachitic pigeon-breast "the sharp bone" (*scearpan banum*) and the narrow chest "*angbreast*" (Heyne; Höfler).*

ISLAM

(732–1096 A.D.)

In the Byzantine civilization, we see a rigid scheme of political dogma imposed upon an isolated community for an extraordinary period of time. In the Mohammedan world, we see the same thing distributed down to the present time over the widest area of space. Whether in Egypt or India, Bosnia or Persia, Islam remains the same. Fatalism and resigned submission to authority characterize the Mohammedan faith, and like the Greeks and the Romans in classical antiquity, the Moslem sees epidemic diseases as scourges of God and is ignorant of the fact of contagion. A rigid conservatism prevented him from grasping the larger problems of public hygiene, and what progress he made in the sanitation of private life was due to the wise teachings of the Prophet, and to the native ingenuity of the Moslem chemists and craftsmen. To Mohammed was due the interdiction of female infanticide (Koran, XVI, 60–61) and the state care of foundlings. The pagan Arabs of the pre-Islamitic period buried their daughters alive.

The **Koran**† prescribes that mothers shall suckle their children for two full years (II, 233), or that the total period of pregnancy and lactation up to weaning

* Moriz Heyne: "Körperpflege und Kleider bei den Deutschen von den ältesten geschichtlichen Zeiten, etc.., Leipzig (1903), p. 22. M. Höfler, Altgermanische Heilkunde (Puschmann, Handbuch der Geschichte der Medizin, Jena, i (1902), p. 476). Cited by W. Ebstein, *op. cit.*, pp. 528–529.

† See T. P. Hughes, "A Dictionary of Islam." London (1885), pp. 50–53.

shall be thirty months (XLVI, 14). If the mother is unable to suckle her child a wet-nurse may be employed (LXV, 6). In the Koran, the stratagem mentioned in Exodus (II, 1–9), whereby the aunt of Moses secured his mother as a wet-nurse, has the *variant* that Egyptian wet-nurses were first offered and rejected (XXVIII, 11), which Opitz interprets as meaning that Mohammed believed that maternal milk strengthens the racial characteristics in a child. These are the only pediatric items in the Koran, a book in which honey is specified as the sole and universal human remedy (XVI, 71).* The rest of Arabic custom in regard to the care of infancy is preserved in the Mohammedan books of ethics as handed down by tradition. At birth, the child is washed, swathed and carried by the chief *malawi* to a gathering of male relatives who chant the *azan* and the *iquamah* (calls to prayer) in the child's left ear, as the Prophet is said to have done to his grandson Hassan. Following another action of Mohammed's, the *malawi* then chews a bit of date-fruit and puts it in the child's mouth. Alms are then distributed, in weight equal to the weight of the infant's hair, shorn for this purpose, and verses from the first chapter of the Koran are recited for the health and prosperity of the child. The friends and neighbors then visit the home with presents and congratulations. The infant is named on the seventh day, usually after the Prophet, his followers or relatives, or some member of the child's family. On the same day is observed Mohammed's ceremony of the *aqiqah*, that is the sacrifice to God in the name of the child of two young unblemished he-goats in the case of a boy, or one he-goat for a girl. The animals are dressed and cooked, and, as the friends partake, they pray as follows:

"O God! I offer to thee, instead of mine own offspring, life for life, blood for blood, head for head, bone for bone, hair for hair, skin for skin, in the name of the great God, I do sacrifice this goat."

This ritual of substituting a scapegoat for the sacrifice of the child itself is enjoined by Mohammedan law and observed in all parts of Islam. On the fortieth day, the mother is purified and is then free to go about as usual. On this day the child is placed in a swinging cradle. If a wet-nurse is employed, she must be a woman of well-balanced temperament, since her traits are apt to be communicated to the child. As soon as a boy can talk, he is taught the opening phrase of the Koran (*Bismillah*). He is then sent to school to learn the alphabet and to recite certain chapters of the Koran. The memorizing of the whole of the Koran completes his religious education. To this are added the ordinary rules of arithmetic. Schools are very numerous in the Mohammedan world. Sir Richard Burton said that "Islam orders a school to be built by whoever erects a mosque." Circumcision (*khitan*) is not mentioned anywhere in the Koran, but it is held to be *sunnah* (necessary and proper), and according to the tradition of the Prophet, who was assumed to have been circumcised. It is usually done in the seventh year, but it is lawful that it be done on the seventh day after birth or at any time between the seventh and twelfth years. The rite is usually performed by a barber and consists in drawing the prepuce tightly forward with a bamboo forceps, causing great momentary pain, which is swiftly terminated by a brisk downward stroke of the knife. The hemorrhage is checked with burnt rags and ashes. In Egypt, the rite is preceded by an elaborate street-parade and ceremonial (Lane). Puberty is established by the inception of virility and menstruation, and is declarable at 15 in both sexes. The Mohammedan theory of life is that a boy should be educated as soon as he is weaned, taught gravity and decorum by extreme respect for his parents and the society of his elders, inured to hardship and contempt for luxury, set to employment he is best qualified for (vocational aptitude being often determined by horoscope), and married as soon as he is established in the world. The training is stoical, designed to make warrior-gentlemen. The only objects of food, worldly possessions, sleep, etc., are the maintenance of health. Food and drink are held to be medicine for the cure of hunger and thirst and are to be as sparingly used as drugs. Delicacies and a varied diet are scorned. Subsistence upon a single dish or upon dry bread is held to fit a man for hard times.

* K. Opitz, "Die Medizin im Koran." Stuttgart (1906), pp. 15–16.

Little meat is eaten and liquids are not drunk at table. Physical hardening is attained by intensive exercise. To sleep by day is despicable. Strong drink, sweetmeats and unusual creature comforts are forbidden. Wealth and luxury are despised as diminishing the capacity to endure the desert, if necessary. The attainment of an elegant dignified style of manners is a worthy ambition. Actions are open and above board, lest they be culpable, and a child is trained to silence. The seven deadly sins of Islam are "disobedience to parents, idolatry, murder, falsely accusing modest women of adultery, wasting the property of orphans, usury, and desertion of an expedition against infidels." The grave decorous attitude of the boy toward his parents fits him, as Lane says, for an abrupt introduction into the world, and for society.* Sir Richard Burton,† however, found the children at Medina, like the *enfants terribles* of India, "a nursery of madlings, pulling to pieces everything they could lay their hands upon, and using language that would have alarmed an old man-of-war's-man." He says that "parents and full-grown men amuse themselves with grossly abusing children, almost as soon as they can speak, in order to excite their rage and to judge of their dispositions." The object is to temper them for life. Punishments are often in the nature of tongue-lashing, and, in corporal punishment, blows are short, sharp, decisive and few in number, lest punishment lose its power. Girls do not learn to read or write, but are brought up in rigid seclusion and taught only domestic matters. Burton, in his "Notes on Waitz's Anthropology," says of the Oriental policy of seclusion: "The Muslimah is certainly guarded from temptation; and when she falls into it she is deservedly punished. The Christian woman is exposed to every risk, and placed upon a comfortless eminence, that publicity may deter her from yielding."‡ Although the tales of Aladdin and Sinbad have delighted the children of civilized humanity for centuries, the entire Arabian Nights contain only two references bearing upon our subject, *viz.*, that Arab infants are commonly carried astride the nurse's hip or shoulder and that the expression "child of the nurse" implies that an individual has been delicately reared (Burton).

The pediatric literature of Islam is meagre and far inferior to that of Byzantium. Rhazes, Avicenna and Haly Abbas, in fact, took much of their pediatrics from Oribasius and Paul of Ægina. Appended to the ten books of **Rhazes** (869–962) "*ad Almansorem*" is a brief pediatric treatise (*De ægritundinibus puerorum et earum cura*) in 24 chapters, each descriptive of a separate disease. This treatise was liberally copied by Avicenna, Bagellardo and the subsequent authors.

The chapters deal with an impetigo-like head eruption (*sahafati*), a favus variety of the same (*favositas puerorum*), hydrocephalus, tympanites (inflated abdomen), sneezing (coryza), wakefulness, epilepsy, indigestion, aural discharges, purulent otitis (*de veneno fluente de auro*), diseases of the eyes (conjunctivitis), infantile strabismus (*de obliquitate visus*), disease of the teeth, aphthæ, vomiting, diarrhea, constipation, cough, pruritus and rashes, intestinal worms, umbilical hernia, fissure (*de crepatura*), vesical calculus, and relaxation and spasticity of the limbs and body (*siphac*).§ The merit which these individual chapters possess over other clinical paragraphs of the same kind, for a long time before and after,

* Lane, Modern Egyptians.

† Sir R. F. Burton, "Pilgrimage to Al-Medinah and Meccah," London, ii (1893), pp. 292–293.

‡ Burton: Anthrop. Rev., London, ii (1864), p. 249.

§ *Siphac*, according to Hyrtl, is a generic term for membrane or skin. Rhazes' definition of "relaxation" reads like a foreshadowing of infantile paralysis: "Relaxatio accidit pueris vel *in uno membro* vel toto corpore et prohibet ipsum ab ambulatione et motu; provenit propter viscosum humorem *relaxantem nervos*" (Cap. XXIV).

is that the semeiology of each disorder is clearly stated, as far as the author's knowledge goes, that where etiological reasoning is attempted, a simple commonsense cause (such as *corruptio lactis*) is assigned, with little reference to humoralism. The treatment, while mainly herbal, is usually plain and simple with a little touch of superstition here and there. Rhazes notes the yellow stools and griping pains in infantile diarrhea (*albedo in egestione et tortio in ventre*), and recommends the application of an *emplastrum constipans* to the abdomen. For insomnia, oil of violets in vinegar or oleum anetinum with lettuce juice are put in the child's nostrils, and, of course, it is allowed to suck syrup of poppies, while the temples and forehead are bathed with oil of opium and crocus. In epilepsy, the diet is to be regulated, the nurse purged; the child is given only what milk it can digest; it is given asafœtida to smell, and (a remnant of the cult of Apollo) a peony is suspended around its neck and an emerald attached to its feet. Poppies, among other simples, are exhibited in cough. In vesical calculus, the strangury, tenuous stream of urine, great pain and penile pruritus are noted. The prescriptions for syrups, electuaries, plasters, etc., are written in modern style, with the Arabic symbols.

The treatise on smallpox and measles of Rhazes, translated into English by W. A. Greenhill (1848), is perhaps the most remarkable contribution to internal medicine between Hippocrates and Sydenham.

After making the usual obeisance to Galen, who has vague references to smallpox, Rhazes notes the frequency of the disease in children, and gives a most minute account of the semeiology, differentiating it from measles; the mild and fatal varieties of both diseases are carefully defined; the dangers to the eyes, ears, nose, throat and joints are accentuated in a special chapter; the prevention and treatment are detailed at great length, *viz.*, cupping in sucklings, venesection after 14, the diet "such as extinguishes heat," snow-water and other cooling drinks, acid fruits, cold baths, etc., warm compresses, to accelerate the eruption; with special treatment for the eruption and the scars.

According to Hennig, Rhazes held that cheese causes calculi and overfeeding scrofula. He showed that the urachus lies in the umbilical cord.

The "Canon" of **Avicenna** (980–1036) contains (Lib. I, Fen. 3) four chapters on the hygiene of newborn infants, the regimen of the diseases of infancy and the hygiene of childhood, followed by 19 chapters on the hygiene of adolescence, including exercise, bathing, diet, sleep, and the overcoming of lassitude.

After the usual directions for bathing and swathing the child and the selection of a wet-nurse, the following diseases are mentioned in remarkable terse fashion, with neither definition nor semeiology, but a considerable amount of dry detail as to treatment: vomiting, abscesses (*apostemata*) in the gums and mouth during dentition, tetanus, cough, rheumatism, aphthæ, otitis media, meningitis and cerebral abscess, hydrocephalus, conjunctivitis, cataract (*albedo in pupillis*), fevers, coryza, pustules on the body, tumors in the groin, umbilical abscess, sleeplessness, hiccough, vomiting, weak stomach (*stomachi debilitas*), terrifying dreams, abscess in the throat, stertorous breathing in sleep, tympanites (*ventris inflatio*), hernia, tenesmus, worms and abrasion of the hip (femoral intertrigo). The subject mtter is obviously derived from Rhazes, with a few extra therapeutic wrinkles. In the chapters on childhood and adolescence, the child is to be guarded against excesses of temper and low spirits and if its sleep is restless, alternate playing and feeding are recommended. At six, when the child's instruction begins, it should be allowed to learn gradually and not be driven, and there must be more exercise before eating and less bathing. Wine is interdicted, as a cause of congestion, choler and frequent urination. Exercise is treated at great length.

Avicenna described anthrax (Persian fire) the Guinea worm (*Vena medinensis*), recognized the sweetish taste of diabetic urine (known also to the Hindus) and standardized the irrigation of wounds with wine for the entire Middle Ages. The Juntine editions of 1595 and 1608 contain striking plates of the Hippocratic method of treating spinal deformities by forcible reduction, reintroduced by Calot in 1896.

Ali ben Abbas or **Haly Abbas** (–994 A.D.) maintains that male infants are born heavier than females, mentions a case of superfetation, recommends treating atresia ani with the finger or phlebotome, and in his "Liber Regius" (I, IX, Chap. 63, I, 19–22) gives some details about the diseases of infancy (Hennig).

The surgical treatise of **Albucasis** (11th Century) contains chapters on the operative treatment of infantile hydrocephalus (Chap. 1), the extraction of teeth (Bk. II, Chap. 30), the treatment of congenital imperforate urethra (Chap. 55), the repairing of effects of malpractice in circumcision (Chap. 57), the treatment of imperforate anus (Chap. 79).

THE MIDDLE AGES

In the Middle Ages, the power of imperial Rome did not end with the downfall of the Roman Empire, but was modified by the teachings of Christianity, and for over a thousand years the great city continued to be a world-center under the sway of the Roman Catholic Church. The utterances of Christ himself about children, the Latin hymns of Ambrosius, St. Augustine's account of his boyhood, and the many figurations of the Madonna and the Christ-child in oil painting, majolica and terra cotta are all eloquent of an entirely new feeling toward childhood and parenthood. Through the influence of Christianity, **edicts against infanticide** and the selling of children into slavery were issued by the Roman emperors Constantine (315, 321), Valentinian, Valens and Gratian (374), Valentinian, Theodosius and Arcadius (391) Honorius and Theodosius (409), Theodosius II (438), Valentinian III (451), but beginning with Barnabas, a contemporary of the Apostles, the founders of Christianity had, long before this period, established the fact that infanticide, by exposure or otherwise, is a heinous crime. In a long series of bold, vigorous pronouncements addressed directly to the people, the fathers of the Church denounced infanticide and abortion, in the manner of the Hebrew prophets.* The belief that even the unborn child has a "soul" did much to obliterate these practices.†

The sentiment goes back to a passage in a letter attributed by Origen to Barnabas, a contemporary of the Apostles: "Thou shalt not slay the child by procuring abortion, nor again shalt thou destroy it after it is born." Justin Martyr (2nd Century A.D.) said that

* For the Latin texts, see J. F. Terme and J. B. Monfalcon: "Histoire des enfants trouvés," Paris (1840), pp. 69–74; and the effective summary of Payne, *op. cit.*, pp. 257–271.

† Lecky, "History of European Morals," New York, ii (1869), pp. 34–36.

"to expose newly born children is the part of wicked men"; and, with equal force, he stigmatized the sin of rearing girls only for the trade of prostitution. His feeling about marriage ("If we marry, it is only that we bring up children") is at one with that of Virchow ("*Man schliesst doch keine Ehe um kinderlos zu bleiben*"). Tertullian (200 A.D.) made bold to address the sovereign power of Rome itself in the following language: "Rulers of the Roman Empire, seated for the administration of justice on your lofty tribunal—you first of all expose your children, that they may be taken up by any compassionate

FIG. 3.—Rogier van der Weyden (1400–1464): St. Luke in physician's garb.

passer-by," and addressing the people themselves, he says: "Although you are forbidden by the laws to slay new-born infants, it so happens that no laws are evaded with more impunity or greater safety, with the knowledge of the public and the suffrage of this entire age." Clement of Alexandria (–220 A.D.) said: "Man is more cruel to his offspring than animals." Minucius Felix (2nd Century A.D.), a Roman lawyer converted to Christianity, attributed the practice of infanticide to the callous pagan trait of delight in bloody sacrifice, and likened those who followed it to aboriginal Saturn, who devoured his own offspring. Lactantius (4th Century A.D.) said that to strangle newborn children is the greatest impiety, "for God breathes into their souls for life, not for death." And again, he says: "It is as wicked to expose as it is to kill." Basil the Great (330–379 A.D.) and Ambrosius (340–397 A.D.) fulminated against the sale of free children to gratify the avarice of their parents' creditors. The exhortations of the Fathers were,

in time, actually read into the decrees issued by the Councils of the Church,* thus continuing the spirit of the edicts pronounced by the better sort of Roman emperors. In 314, the Council of Ancyra decreed that a woman who killed her offspring should not be permitted to enter a church for the rest of her life. The Council of Nicæa (325 A.D.) decreed that, in each Christian village, a xenodochion, or hostelry for the sick, poor and vagrant, should be established. Some of these xenodochia became brephotrophia or asylums for children. The Council of Vaison (442) provided that an abandoned child should find sanctuary in a church for ten days, that its parents might be found, after which false claims upon the child were punishable by the Church laws against homicide. This was confirmed by the Councils of Arles (452) and Agde (505), and mothers, who were driven to abandon their new-born offspring through shame or poverty, now left them in the marble receptacle at the church door. This privilege was freely granted at the Council of Rouen. The Council of Constantinople (588) compared the crime of infanticide to that of homicide, and finally Sixtus V (1585–1590) and Gregory XIV (1590–1591) decreed that those guilty of infanticide should suffer capital punishment. Finally, the legal code of Justinian (528–534) conferred absolute liberty upon foundlings, and a law of 553 decreed severe punishment for the enslavers of exposed infants. These drastic enactments, which indicate the frequency of infanticide in the early days of Christian Rome, were the direct outcome of the teachings of the Fathers of the Church. When we reflect that much of the antagonism of the proud Roman toward the early Christians is voiced in the famous sarcasm of Gibbon—that their religious scruples "contributed rather to exclude them from the service than to excuse them from the honors of the State and the Army," we can appreciate all the more the courage which impelled them to live up to their convictions in the stand they took for the rights of the child. As Payne says, when "Church and State unite in defense of the child's right to live, then, for the first time in history, religious and civil law became identical with humane sentiment." Among the Gaulish and German barbarians, the *patria potestas* was absolute. Exposure and infanticide were not infrequent, and were punishable in the Salic, Alemannic, and Visigothic codes by a *wergeld* (blood-money), which was only in the nature of a light fine. The Visigothic Code was more severe in the matter of abortion.

In the Dark Ages, thousands of children were exposed, abandoned or sold into slavery by the impoverished inhabitants of Gaul, Germany and Britain, and not only did those wanderers sell their own offspring and the exposed infants they had picked up, but even stole the children of the well-to-do for this traffic. Some of this misery was alleviated by holy men, who purchased these children outright as chattels of the Church.

In 787, **Datheus,** Archbishop of Milan, founded the first asylum for abandoned infants in the following declaration:

* Terme and Monfalcon, *op. cit.*, pp. 78–81. Payne, *op. cit.*

"Now, therefore, I Datheus, for the welfare of my soul and the souls of my associates, do hereby establish in the house that I have bought next to the church, a hospital for foundling children. My wish is that as soon as a child is exposed at the door of a church, it will be received in the hospital and confided to the care of those who will be paid to look after them."*

The foundlings thus cared for were taught a trade and given their freedom at the age of eight.

Fig. 4.— Hans Holbein the Elder (1460–1524): Birth of the Virgin.

Other **foundling asylums** were later opened at Montpellier (1010), Marseilles (1199), Embeck (1274), Venice (1380) and Florence (1421). In the fifteenth century, there were 900 children in the foundling asylum at Naples. Others existed at Rome, Berglac and Troyes. A new asylum was opened at Milan in 1168, and in 1204, Innocent III, moved by the many bodies of infants fished up out of the Tiber, dedicated part of the hospital of Santa Maria in Sassia (1198) to the care of foundlings. The famous Spedale degl' Innocente at Florence was founded on October 25, 1168. Another was built by Brunelleschi in 1450. The first combined lying-in hospital and foundling asylum was founded by Enrad Fleinz at Nuremberg in 1331. In 1362, a similar orphan asylum was founded at Paris. A bull of Nicholas IV gives a long list of these institutions in Italy, Sicily, Germany, England, France and Spain.

* Payne, *op. cit.*, p. 294.

In 1523, the Hôtel Dieu of Lyons, the oldest hospital in France, began to take in children. But the new movement for the protection of friendless children was to culminate in the devotion and labors of St. Vincent de Paul (1576–1660).

In the art of the Middle Ages, the Madonna and Bambino were favorite themes of painters, and many scenes in the lying-in room, including the bathing and swathing of the new-born, are preserved in oil, fresco, majolica, ivory relief and the wood-cuts of the time.

The lying-in room is usually represented as filled with busy people, and the nurse-maid is often figured as testing the temperature of the water for the baby's bath with bared feet. Breast-feeding was the rule everywhere, and the wet-nurse as foster-mother of the child, held her own until the 19th century when "the sucking-bottle, a kind of pocket wet-nurse, was her undoing" (Forsyth).* That the danger of suffocating infants by overlying was recognized is indicated in a German placard of 1291, cited by Sudhoff (Dresden Catalogue, item 6375), forbidding mothers from taking to bed with them infants under three years of age.

In medieval medicine, there was much excellent surgery, and the Jewish concept of the actuality of contagion was definitely read into the many hygienic ordinances improvised by municipalities against leprosy, bubonic plague and syphilis. Internal medicine was, however, mainly scholastic in character, and most treatises of the time were either translations or compilations from the medical writings of the ancients. This tendency of the pre-Renaissance period, receptive yet credulous, may be summed up in the words of Dr. Johnson.†

"Learning was then rising in the world; but ages so long accustomed to darkness were too much dazzled with its light to see anything distinctly. The first race of scholars in the fifteenth century, and some time after, were for the most part, learning to speak rather than to think, and were therefore more studious of elegance than of truth. The contemporaries of Boethius thought it sufficient to know what the ancients had delivered. The examination of tenets and of facts was reserved for another generation."

In other words, the internists of the time frittered away their opportunities, for the most part, in the attempt to achieve huge summaries of everything known in the past (*summa medicinalis*), after the fashion of Galen, the Byzantine writers and Avicenna. Where internal medicine is really forward and flourishing, as in the eighteenth century, pediatrics is sure to thrive.

The Middle Ages made no contributions of value to the literature of pediatrics, unless we include the three treatises of Bagellardo, Metlinger and Roelants, which were published by authors who flourished long after the invention of printing.

* D. Forsyth, Proc. Roy. Soc. Med., London, iv (1910–11), pt. 1, Sect. Dis. Child., p. 113.

† Samuel Johnson, "A Journey to the Western Islands of Scotland." London, (1775).

In the palmy days of the School of Salerno, the writers of the twelfth and thirteenth centuries began to produce lengthy treatises on the practice of medicine, in which the different local diseases were handled *seriatim* "from head to heel" (*a capite ad calcem*). Pediatric knowledge, in such treatises as these, was not segregated and individualized, but was scattered about through the chapters on epilepsy and other diseases liable to affect infancy. Thus the gynecological treatise of Trotula (*De passionibus mulierum*) contains, contrary to ancient custom, short chapters on the regimen of infancy, the election of a wet-nurse, and no more. This is also true of the *Physica* of St. Hildegarde (1099–1179). The obstetric portion of the Breviary of Arnold of Villanova (1235–1312) treats of a few female complaints with lengthy directions for the prevention of conception and the artificial production of pseudo-virginity (*ut mulier non concipiat, et ut virgo videatur*). The same thing (*De sophisticatione vulvæ*) is found in the Compendium medicinæ (1510) of Gilbertus Anglicus (Handerson). The 13th century *Régime du corps* of Aldebrandino of Sierra contains two short chapters on the hygiene of infancy, childhood and adolescence.* The later writers on internal medicine, were, by preference, translators, "aggregators" (compilers), "concorders" (arrangers) and "conciliators" (reconcilers of disparate doctrine). In the huge treatises of Gilbertus Angelicus (–1250), Taddeo Alderotti (1223–1303), Peter of Abano 1250–1315), Bernard de Gordon (*circa* 1285–1307), and Niccolò Falcucci (–1412), pediatrics is not anywhere featured as a separate subject, as in Soranus, Oribasius and Paul. The *Practica* of Savonarola (1390–1462) again treats only of diseases "from top to toe" (*a capite ad pedes*), after the Salernitan fashion. The tendency of internal medicine was purely scholastic. The outstanding contribution of the Middle Ages to infant welfare is to be found, not in the books, but in the efforts of the Church to check abortion and infanticide.

THE RENAISSANCE PERIOD

(1453–1600)

The Revival of Learning in Europe really began with the printing of the Gutenberg Bible at Mainz (1454), one year after the fall of the Eastern Roman Empire (1453). After that event, the Greek scholars of Byzantium began to pour into Italy, and after the sack of Mainz (1462), the German printers spread over Europe, and began to publish books everywhere. The effect of all this was to disseminate knowledge in a rapid, effective manner, and with the revival of Greek culture there arose a new species of physicians, the medical philologists who supplanted the medieval compilers and commentators, and introduced the critical, challenging spirit in their examination of the older medical writings. In Germany, France and England, many medical books and tracts were published for the first time in the vernacular, and, through this medium, botany, surgery, obstetrics, ophthalmology took on a new lease of life. Anatomy received a tremendous impetus at the hands of Leonardo da Vinci, Vesalius, Eustachius and Fallopius, pathology was forwarded by Benivieni, the modern theory of contagion was stated in striking form by Frascastorius, chemical therapeutics was grounded by Paracelsus, and gynecology, pediatrics, medical jurisprudence and veterinary medicine began to be individualized in books devoted to these specialties alone.

Infantile mortality in the sixteenth and seventeenth centuries

*Le Régime du Corps de Maître Aldebrandin de Sienne, texte française du xiiie siècleéd. L. Landouzy et R. Pepin, Paris (1911), pp. 74–80.

was very high, owing to the low estate into which public and personal hygiene had fallen, on account of the many wars and epidemics with which Europe had been plagued, and the indifference of the aristocracy to the misery of the people. By decrees of the Parliament of Paris in 1547 and later, the great nobles were required to care for the foundlings abandoned in their domains, but the mandates were evaded or neglected. Although the churches and monasteries still looked after infants left at their doors, children were frequently found dead from cold and hunger on the streets, or were fished up drowned out of the sewers. Froude, at the beginning of his History of England, speaks of the almost stationary condition of the English population at this time. Yet the artists of the German and Italian Renaissance glorified maternity as the chief end of womanhood, and the lying-in room was frequently represented by Holbein and others, showing the modes of bathing, swaddling and cradling the infant, the nurse usually testing the temperature of the water with her bared foot.

Of the many pediatric treatises and tracts of the Renaissance period, the earliest were the late fifteenth century incunabula of Bagellardo, Metlinger and Roelants, the latter of which was destined to be almost obliterated under the name of Sebastianus Austrius.

Pietro **Bagellardo,** of Fiume (Bagellardus de Flumine) (–1494) began to teach philosophy at the High School in Padua in 1441, and medicine about 1444–58. In 1472, he became professor ordinarius of theoretical medicine, and continued to teach at Padua for eight years. He was known and respected even at Venice, whither he was invited by the Doge to view the remains of St. Luke in the church of St. Justina. He settled in Venice in 1480, and died there in 1494.* In 1472, he published the first distinct treatise on pediatrics (*De aegritudinibus infantium*) one of the first medical incunabula to be printed. Three separate editions of this work exist, *viz.*, the small quarto of 40 leaves (80 pages) published at Padua on April 21, 1472 (Hain, 2244), an Italian edition (*sine loco*) published on March 10, 1486 (Reichling, 414) and the Paduan edition published on November 10, 1487 (Hain, 2245).† The editions of 1472 and 1488 can be seen in the Surgeon General's Library.

This treatise, which follows that of Rhazes very closely in arrangement of contents and subject matter, begins with a florid dedication to Niccolò Truno, Duke of Venice, passing, over the page, into Part I, which deals with the care of the infant in the first month of life. After the usual obstetric directions as to the careful examination of the newborn before severing the umbilical cord, the nurse is directed to place the child in a pleasantly warm bath, neither too hot, nor too frigid, and not salted after the Greek fashion; the child's head being supported by the left hand of the nurse and the right hand cleansing all parts of the body with gentle friction; the child is then carefully wiped, swathed and cradled in a cool shady part of the house; its first food should be sugared baked apple (*pomi cocti perfecta coctione permixto zucaro*). Minute directions for lactation, choice of

* K. Sudhoff, Janus, Amsterdam, xiv (1909), pp. 468–469.

† The bracketed figures refer to the check numbers of these incunabula in the catalogues of Hain and Reichling.

wet-nurse and care of the child up to the end of the first month follow. The directions for crooning a song while rocking the cradle read very quaintly. Part II consists of 22 chapters dealing with infantile diseases, *viz.*, *saphatie* (tinea capitis) and favus, epilepsy, colic (*spasmus*), wakefulness, eye diseases (ophthalmia, tumefaction, strabismus), ear diseases (hemorrhage, otorrhea), abscess of the ear, aphthæ (*alcola*), gingivitis, fissure of the lips, abscess of the throat, cough and rheumatism, diarrhea (*fluxus*), constipation (*stipticitas*), tenesmus, worms, tympanites (*tumor ventris*), dysuria, incontinence of urine, umbilical, inguinal and scrotal hernia (*ramex*) and pruritus, pustules or excoriations (intertrigo) on the legs, thighs, back and body.

Bartholomæus **Metlinger,** a son of Peter Metlinger, an Augsburg physician, is mentioned in the tax-lists of Augsburg for 1472, and, in the same year, was enrolled for instruction at the new University of Ingolstadt. He died circa 1491–2, leaving a widow and children.* On December 7, 1473, his "*Regiment der jungen Kinder,*" a folio incunable of 27 leaves (Hain, 1112) was published at Augsburg by Günther Zainer. This, the earliest pediatric treatise in the vernacular, passed through 8 editions (1474, 1476, 1497, 1500, 1511, 1531, 1539) and was turned into modern German by Ludwig Unger in 1904.† The 1497 edition has an illustrated title-page, representing a German domestic interior, with a swaddled child in the cradle, rocked by its mother's foot. This work, in essence a popular treatise, is, as Abt says, of doubtful scientific value.

Metlinger draws liberally upon the Greek and Arabian writers. Chapter I deals with infant hygiene up to walking and talking, after the practical fashion of Soranus. Chapter II deals with infant nutrition. It contains the first mention of the nippled nursing can ("*tütlein oder krieglein*") and the artificial teat (*zepflin*) for pap. Chapter III with eruptions of the scalp and face (*nerys*), for which a mercurial salve is recommended, hydrocephalus (*Wechselbalg*), meningitis (*durstig*), wakefulness (*Wachen*), convulsions (*Vergicht*), paralysis, otorrhea, conjunctivitis, strabismus, teething, tumors of the neck, aphthæ, bronchial catarrh, disorders of digestion, jaundice, diarrhea (*rur*), constipation, prolapse of the rectum, worms and pains in the body, umbilical and scrotal hernia, urinary calculus, cutaneous ulcers, fever, erysipelas (*gesegnet oder ungenad*), measles and smallpox (*durchschlechten und platern*). The therapy is extensive, often based on personal experience ("*und ich hab es bewärt*"). Chapter IV deals with teaching the child how to run, and its training up to the sixth year, when it should begin studies. Wine should not be given to children under 7, preferably not to boys before 12, nor to girls before 14.

The pathology is throughout humoral (Sudhoff).‡

Cornelius **Roelants** (1450–1458), of Mechlin (Brabant), matriculated (1466) at the University of Louvain, where he graduated in medicine in February, 1480, and was hospital- and city-physician at Mechlin during 1498–1525. He became a highly esteemed practitioner among the nobility, even attending the daughter of Emperor Maximilian. On February 10, 1494, he married Cæcilia von Duffel, who died on February 16, 1519, leaving a son and a daughter. Roelants

* Huber, München. med. Wochenschr., lv (1908), p. 1499.

† L. Unger, "Das Kinderbuch des Bartholomäus Metlinger." Leipzig (1904).

‡ K. Sudhoff, "Deutsche Medizinische Inkunabeln." Leipzig (1908), pp. 38–43. For a good analysis of the contents of Metlinger, see R. Landry, Wien. med. Presse, xliv (1904), pp. 1382–1390.

himself died, at the age of 75, on September 1, 1525 (Sudhoff). About 1483–4, he published a pediatric treatise of 117 leaves (numbered 78–194) of which only the first 77 are printed. The book is dedicated to Philip I (the Fair), Duke of Burgundy. Of this incunable, exhumed by Sudhoff, only two perfect copies are known, *viz.*, those in the Hunterian Museum at Glasgow and the University Library at Leipzig, but there are a few loose leaves in the University Library at Cambridge. Although this text is not accessible, a good account of it is given by its discoverer, Sudhoff.*

After the fashion of the pre-Renaissance compilers who sought to arrange *seriatim* all the opinions of earlier writers on a given subject, Roelants styles himself "aggregator Cornelius" and "aggregator Mechlinensis," patting his authorities on the back with a personal "*bene dicit.*" He draws on all known sources, from Hippocrates and Rhazes, Gerard of Cremona and Gilbertus Angelicus, to Saliceto and Argillata. Sudhoff has further traced his sources to an anonymous pediatric MS. of the 13th century which he has exhumed in no less than 17 medieval codices in the Vatican, Oxford and elsewhere, and to a pseudo-Galenic "*practica puerorum*" of late antiquity, in two MS. codices at Florence (14th century) and Prague (15th century). Although Roelants compiles opinions as a professional "aggregator," he does not withhold his own experience. He speaks of the advantages of blood-letting in the nurse instead of the infant; recommends the blue ring-dove above other doves as an article of infantile diet; shows how the lentil of the Low Countries may be substituted for the "ligni cornua;" describes cancrum oris, feeble locomotion, tumors and treatment of ear diseases from his own experience; and criticizes textual corruptions in the MS. of Avicenna.

Fifteen years after the death of Roelants, as Sudhoff has shown,† the credit of his work was practically taken away from him by Sebastian Ostricher (**Sebastianus Austrius**) (–1550), of Ruffach (Alsace), a learned philological physician who practised at Colmar and published a commentary on the section on personal hygiene in Paul of Ægina (1538). Exasperated by the "barbarous kitchen-Latin" of Roelants, Ostricher undertook to make the text more readable and, in 1540, issued it, rearranged, emendated and dressed up for posterity, as a new work, under his own name. Although he acknowledges the Flemish physician's work as the basis of his own in the preface, he ignores him on the title-page, and the book of Roelants, in this form, is now known to pediatrists as "Sebastianus Austrius." This book was reissued at Leyden in 1544, and again, with a commentary by Nicolaus Fontanus, at Amsterdam in 1642. As a summarizer of then existing knowledge, Sebastianus Austrius, the supplanter of Roelants, is credited with the outstanding pediatric text of the sixteenth century.

Omitting infant hygiene and nutrition, the author plunges into his subject with descriptions of 54 diseases arranged "*á capite ad calcem*" (from siriasis to femoral intertrigo), in as many chapters. The treatment is scholastic and the work should be of great value to pediatrists who wish to trace the changes of doctrine in the texts of classical antiquity and the Middle Ages. The titles of diseases heading the successive chapters include all the synonyms, as in the Systems of Allbutt and Osler. The *saphatie* of Avicenna is identified with tinea capitis, favus (Rhazes) is "kerion;" night-fears are "*pavores*" (Hippocrates, Galen);

* Sudhoff, Janus, Amst., xiv (1909), p. 465; xx (1915), p. 443.
† Sudhoff, Janus, Amst., xiv (1904), pp. 481–484.

epilepsy is the *morbus comitialis* of the Greeks, the *mater puerorum* of the Romans, and the *morbus regius* of the vulgar; paralysis is "*resolutio nervorum;*" infantile convulsions may range from colic to tetany; *glaucedo* (γλαύκοματα) or hypochymata is not the glaucoma of Graefe, but a greenish suffusion of the eyes; ptilosis and psorophthalmia are featured; the *parulides* of Paul are abscesses of the gums and jaws; epulis is the *vesica* of Rhazes; aphthæ is synonymous with *alcola* (Avicenna), *calaba* (Paul) and *ulcus oris* (Pliny); quinsy is *squinantia;* a weak stomach is *stomachus fractus* (Avicenna); diarrhea is *alvi fluor,* constipation *alvus sicca;* the chapter on incontinence of urine is entitled "*de meientibus*" (Paul). The work is prefaced by a dedication to Ferdinand, King of Bohemia, and the Hippocratic aphorisms on infantile diseases. It concludes with 19 aphorisms on infant hygiene and nutrition, of which the following are samples:

3. The infant is to be fed solely on milk up to dentition.

4. Wine and beer are harmful to children as befogging the brain and perturbing the mind by heat.

17. Three modes of lightening the pangs of infancy: apposition of the nurse's breast, gentle dandling and pleasant modulation of the voice.

18. Red coral suspended to the suckling's neck, reaching from the mouth to the stomach, prevents the vomiting of milk and promotes its digestion.

A work of the same scholastic stamp is the large quarto treatise (*De morbis puerorum tractatus*) of Geronimo **Mercuriali** (1530–1606), of Forli, published at Venice in 1583. Mercuriali was a learned medical graduate of Padua, who acquired his extensive knowledge of ancient medicine by seven years of study at Rome, at the instance of Cardinal Farnese. He held the chairs of medicine at Padua (1569–87), Bologna (1587–99) and Pisa (1599–1606). In 1569, he published a learned illustrated treatise on the gymnastics of the ancients, which passed through five editions and made his reputation along with the first formal treatise on skin diseases (1572), a treatise on gynecology (1582) a bilingual (Greek and Latin) edition of Hippocrates (1578) and many learned commentaries on Hippocrates and on difficult passages in the ancient writers (1571). His medical treatises were spoiled by the fact that he allowed his pupils to prepare them for the press. In consequence, the style is diffuse and verbose.

The pediatric treatise, described by Hennig as "an inconsiderable book which long passed as authoritative," was reprinted twice, the second edition (1584) containing Mercuriali's translation of Alexander Trallianus on worms. As with Roelants and Austrius, the text of Mercuriali is that of a medieval "aggregator." The work is divided into three books, the third being devoted entirely to intestinal worms. The arrangement of chapters is irregular; the longest are those on measles and smallpox, emaciation (*de macie*), epilepsy, and stammering. Among the new titles included are scrotal hernia (*ramex*), intertrigo, pernio, putrid fever (*febris synochus*), disordered speech, mutism, disorders of sensation (*de vitiis sensus communis*), dyspnea and scrofula. On the whole, as Hennig intimates, a much-overrated book.

Perhaps the earliest pediatric treatise in the vernacular is "*The Boke of Children*" of Thomas **Phayre** (or Faier) (1510?–60), a charming black-letter appended to "The Regiment of Life" (London, 1545), a popular version of the Salernitan "Regimen sanitatis" by the same author. Phayre was a learned lawyer, physician and translator, an Oxford M. D. of 1558, who later Englished the first seven books of the Æneid.

He begins his little pediatric tract, with a frank avowal of his disinclination to deal with the generation and hygiene of the infant as "pertaining only to the office of a midwife," yet none the less he goes into infant nutrition through 8 pages, urging that the mother nurse her own child. He then gives brief descriptions of 40 diseases, the "remedye" being paragraphed in each case. Among these are "aposteme of the brayne," "swelling of the head," "watching out of measure" (wakefulness), "terrible dreams," "the fallyng evill" (epilepsy), "crampe," "styfnesse of lymmes," "bloodshoten eyes," "nesying out of measure" (coryza), "Quynsye," "straytnesse of wynde" (dyspnea), "colyke and rumblyng in the guttes," "brustynge" (scrotal hernia), "fallyng of the fundament," ague, "kybbes" (pernio), and "swellyng of the coddes," which may be the orchitis of mumps (Hippocrates). The descriptions of diseases have a quaint practical flavor; the treatment is mainly herbal, and sometimes suggests the "frightfulness" of the first London Pharmacopœia (1618).

A far more original pediatric treatise than any of those mentioned is that appended to the 1612 edition of the *Practica der Wundartzney* (1598) of the Swiss surgeon Felix **Würtz** (1518–1575), which in the English translation of 1656, appears as *The Children's Book.* This "*Children's Book,*" the work of a natural-born, self-taught surgeon, is delightfully fresh and vigorous, does not lean upon the old authors, actually tells us something new, and is, even today, a living demonstration of the fact, that the surgeon of Renaissance, dealing daily with the data of actual experience, was capable of better and more practical bedside thinking than the clinical scholiast of the period. "I presume not to write of things which I never had an experience of," says Würtz —"those I leave unto wiser men." This little book is also the first treatise on **infantile surgery.**

After some sensible directions as to the choice of a wet-nurse, Würtz vigorously scores the practice of tight swaddling; gives timely cautions as to the posture of the child in the cradle, the need for gentle rocking; attention to the cause of crying; cramp from lying in wet or cold places, bathing and prompt wiping, especially of the head. Scrubbing the interior of the mouth is particularly bad in thrush, and blisters of the cheeks, tongue or throat. The Swiss methods of spoon-feeding, to prevent burning with hot pap are described, with the danger of injuring the child's mouth by the spoon, and the drinking bottle is to be watched as a source of putrefaction. Itching, burning blisters, "fellow feeders" (comedones), smarting pains, running eyes, sore eyes are paragraphed. Würtz gives his own personal experience as to the harmful effects upon the eyes of bright light and shining things generally. Conrad Gesner himself prescribed venesection in his case. "Winding children into clouts" is again denounced, and a long orthopedic section "of crooked and lame children" follows: "a fit garment for children to wear in their cradles," the danger of rough dandling, carrying and dancing on the knee, fractures, dislocations, convulsions and blindness from these causes, the dangers of too early standing and walking by means of stocks and running stools, and the necessity of protecting the child's face from flies, make up the rest of this straightforward exhortation. The surgeon's quaint piety, his big humanity, and his vigorous vernacular suggests the sermons of Bishop Latimer (1562) and Abraham á Sancta Clara. As the first contribution to infantile orthopedics, this little work is easily the most original pediatric treatise of the sixteenth century.

Other pediatric treatises were published by Michel Angelo Blondi (Venice, 1537), Petrus Jacobus Toletus (Leyden, 1538), Paul Cornelius (Basel, 1540), Hieronymous Montanus (Lyons, 1550), Ludovico Lobera de Avila (Pincia, 1551), Marco Mironi (Turin, 1553), Leonelli (Venice, 1557), Johan Kueffner (Venice, 1557), B. Russeus (Louvain, 1559), L. Faventinus de Victoriis (Leyden, 1574), Omnibonus Ferrarius (Brescia, 1577), and Jacob Tronconi (Florence, 1594). A

French medical poem on breast feeding (*Manière de nourrir les enfans à la mamelle*) was published by Scaevola Gaucher de St. Marthe in 1598, and translated into English as "Paedatrophia" by H. W. Tytler (London, 1797). Tracts and dissertations on monsters by Sorbinus (1570), Limmer (1594), Euonymus (1595) and Winrich (1595); a poem on infantile atrophy by Julius Alexandrini (Zürich, 1559), a dissertation (*De tabe infantum*) by Reusner (Basel, 1582); a colloquy on dentition by F. M. de Castrillo (Valladolid, 1557); dissertations on worms by H. Brille (1540), H. Gabucinus (1549), Savanarola (1560), Nymann (1594), Hoffmann (1595), and a dissertation on rachitic infantile atrophy by Teichmeyer (Jena, (1515) are listed in Meissner's bibliography of pediatrics.

The epidemics of smallpox and measles in Germany (1493), Sweden (1578), and elsewhere occasioned a large number of tracts on smallpox and measles which were a sort of prelude to the vast smallpox literature of the seventeenth and eighteenth centuries. **Syphilis,** first mentioned in the Edict against Blasphemers of Maximilian I (1495) and named in the poem of Frascastorius (1530), was the subject of a large number of treatises by Konrad Schelling (1496), Joseph Grünpeck (1496), Leonicenus (1497), Joh. Widmann (1497), Montagnana (1498), Torella (1500), Lacumarcino (1524 *vel subseq.*), Massa (1532), Fernèlius (1538), Fallopius (1564) and Luisinus (1566). Among the original descriptions of new diseases were those of **typhus fever** by Fracastorius (1546), **varicella** by Ingrassias (1553) **tabardillo** or Mexican typhus by Francesco Bravo (1570), and **chlorosis** (*morbus virgineus* by Johann Lange (1554). **Whooping cough** (*quinta*) was described for the first time in 1578 by Guillaume de **Baillou** or Ballonius (1538–1616), a dean of the Paris faculty, whose posthumous writings include treatises on convulsions (1640), rheumatism and dorsal pleuritis (1642), diseases of virgins and matrons (1643), and a disputation of 1595, in which it is maintained, in consonance with the old Hippocratic teaching, that those who acquire a gibbous spine, from cough or asthma, before puberty, will soon die. Baillou's account of whooping cough was followed by the "*Synopsis novi morbi*" of Beckel (Helmstädt, 1580), in which the ravages of the disease (*catarrhus febrilis*) through the length and breadth of Europe are described.

The facies of **adenoid vegetations** is reproduced for the first time, *sans le savoir*, in Lucas van Leyden's portrait of Ferdinand I of Spain (1524), and the many paintings of the prognathous Hapsburgs and Medici would now be regarded by dentists as figurations of malocclusion.

In the late fifteenth and sixteenth centuries, all modes of **artificial nutrition of infants** were in vogue. In default of the mother's breast or the wet-nurse, the child was fed on cow's milk or goat's milk by means of sucking horns, sucking cans with artificial nipples, the spoon, or by sugar lumps and bread rubbed into a piece of linen, shaped into an artificial nipple.

The sucking horn (*cornette*) is mentioned, in *Robert le Diable*, a French metrical romance of the 13th century, in *Die gute Frau*, a German poem of the same period, and in the Autobiography of Thomas and Felix Platter (16th century), in which Thomas describes himself as weaned by means of a horn, his mother not being able to nurse him on account of inflammation of the breast. The sucking can mentioned by Mettlinger as *tüttlin* (1473) and called *memlin* by Albertus Magnus, was provided with a nipple or a spout, and of varied shape, sometimes simulating the contour of the breast, sometimes as crude in form as the pottery of primitive man, sometimes resembling a barrel, an hour-glass, or a bell. Spoonfeeding and sucking cans are shown in three 16th century pictures in the Cologne museum, The Three Kings (H. Bles), The Adoration of the Shepherds (M. van Heemskirck), and a triptych of the Virgin by an unknown Frankfort painter. The artificial teat (*Zulp or Zepflin*) mentioned in Mettlinger (1473) and in Röslin's *Rosegarten*

(1513) is figured in Albrecht Dürer's "Madonna with the Greenfinch" of 1506 (Kaiser-Friedrich's Museum, Berlin), and in a modern Domestic Scene by J. G. Hantsch (Leipzig Museum). Breast-feeding, spoon-feeding, and can-feeding are all shown on a woodwork altar from St. Gertrude's Church at Lübeck (late 15th century, now in the Lübeck Museum—Brüning).*

In the Renaissance period, much attention was paid by the writers of the time—Erasmus, Rabelais, Ascham—to the education and training of children. Rabelais in particular, ridiculed the time-honored custom of stuffing a lad with dull book,

FIG. 5.—St. Gertrude's altar (15th century, showing breast-feeding, spoon-feeding and bottle-feeding (Lübeck Museum). (From H. Brüning: Geschichte der Methodik der Künstlichen Säuglingsernahrung, Stuttgart, 1908, p. 77.)

earning, and advocated education in the old Greek and the modern sense, as a deliberate drawing out of the latent faculties by the aid of open-air exercise, equitation, swimming, archery, dancing, etc. In England, among the wealthy and the well-to-do, this cult took the peculiar line of sending the children away early to live in the homes of great nobles as pages and henchmen, in order to learn the rules of etiquette, music, the theory of precedence, how to carve and other essentials of the training of gentlemen and gentlewomen. These retainers were sometimes austerely handled by the great, and among children sent to school or indentured to apprenticeship in the trades and crafts, punishments were severe and drastic. Longchamps, Bishop of Ely, is said to have pricked the sons of nobles who acted as his servants, with a goad, "mindful of his grandfather of pious memory, who, being of servile condition in the district of Beauvais, had, for his occupation, to guide the plough and whip up the oxen." Relics of this austere preoccupation with etiquette and good form are to be found in such treatises as John Russell's Book of Nurture, Wynkyn de Worde's Book of Kervynge (1513), The Book of Curtasye (Sloane Ms., 1460), The Babees Boke, Lerne or be Lewde, The Lytyll Children's Lytel Boke, Stans Puer ad Mensam, the Birched School-

* For other pictures, see Auvard and Pingat, "*Hygiène infantile et moderne.*" Paris (1889), pp. 59–74; and H. Brüning, "*Geschichte der Methodik der künstlichen Säuglingsernährung.*" Stuttgart (1908), *passim.*

Boy (1500), etc., all which have been preserved in F. J. Furnivall's Early English Meals and Manners (Early English Text Society, No. 32, London, 1868).

THE SEVENTEENTH CENTURY

The seventeenth century was an age of great poets (Shakespeare, Milton), great dramatists (Calderon, Molière, the Elizabethans) great philosophers (Spinoza, Bacon, Locke, Descartes), great painters (Velasquez, Rembrandt), great musicians (Bach, Purcell) and great mathematicians (Newton, Halley, Leibnitz). In this age, the English physician William Gilbert wrote his epoch making treatise on magnetism (1600), Harvey demonstrated the circulation of the blood (1616–28), the anatomical discoveries following Vesalius and Harvey were all of physiological import, microscopy was founded by Kircher, Hooke, Leeuwenhoek, and Swammerdam, histology by Malphighi, physiological optics by Kepler, Descartes, Mariotte, and Scheiner, the physiology of digestion by Peyer, Brunner, and de Graaf, the physiology of respiration by Boyle, Hooke, Lower, and Mayow, vital statistics by Graunt, Petty, and Halley. Transfusion, anatomic injection, the obstetric forceps, timing the pulse, and clinical thermometry were introduced, and internal medicine was represented by the great name of Thomas Sydenham.

In the art of the seventeenth century, children play a prominent part, whether in the wonderful "Las Meniñas" of Velasquez, Van Dyck's "Baby Stuart," Rubens' many pictures of the charming Helena Fourment and her children, Rembrandt's "Venus and Amor" (Hendrickje Stoffels) and his comical "Ganymede," or Johan van Neck's painting of a dissection conducted by Dr. Frederik Ruysch (1683), in which a child plays with an infantile skeleton in the corner.

Infantile pathology is represented in the cretinoid or hydrocephalic dwarfs of Velasquez, Ribera's portrayal of a paralytic boy, Gabriel Metsu's Feverish Child, and the picture of a girl afflicted with dystrophia adiposo-genitalis by Juan Careño de Miranda. Rubens delighted in the representation of healthy, round-limbed, laughing babies. His "Garland of Fruits" symbolizes, in a manner, the eugenic ideal of the late Renaissance, for the artists of the period glorified the state of maternity in the full-bodied woman, fit to be "the justified mother of men."

Yet the seventeenth century was an age otherwise notable for cruelty to children.

In an *arrêt* of the Parliament of Paris (September 3, 1667); it was decreed, in the interests of the special hospitals, that the *grands seigneurs* or high officers of justice should be held financially responsible for the care of all infants of unknown parentage found on their lands and taken to the hospitals; but the tight-fisted nobles did not live up to their obligations, and the poor foundlings were shifted from place to place by those who did not want them. In Paris, as in ancient Rome, unfortunate mothers threw their offspring into the sewers, abandoned

them at the doors of hospitals, or left them in the streets to die. The laws were severe—hanging for infanticide, whipping and disgrace for abandonment, declaration of paternity in seduction—and rigidly enforced, but the full penalty was paid by the infants themselves.

FIG. 6.—Rubens: The Garland of Fruit (Düsseldorf Gallery). (Eugenic ideal of the late Renaissance Period).

Some children in the crowded charitable retreats were exposed anew or drugged to death with opium in order to keep them quiet; others were used as beggars, to make money, and some were artificially malformed to this end.* The extraordinary number of beggars, professional cripples, blind and deformed persons held up to ridicule in the etchings of Callot and the paintings of the elder Brueghel suggests that the thematic material of Victor Hugo's "*L'homme qui rit*" is not entirely exaggerated. In this novel, which deals with the surgical malformation of a child's face for political reasons, there is a chapter devoted to the professional buyers and sellers of friendless children (*los comprachicos*),† a strange affiliation of seventeenth century criminals who, as in the later Roman Empire, purposely lamed and maimed unfortunate children by a reversed orthopedic procedure (*chirurgie au rebours*). According to the romancer, the master of this art of facial disfigurement was a certain Dr. Conquest, who wrote a (perhaps mythical) Latin treatise on the subject. A Latin citation of the procedure is given from an alleged chapter "De Denasatis," as thus: "*Bucca fissa usque ad aures, genzivis denudatis, nasoque murdridato, masca eris, et ridebis semper*"‡—the ideal of the "false-face" mask from time immemorial.§ In some parts of Spain (Oyarzun, Urbistondo, Lesa,

* Payne, *op. cit.*, pp. 302–305.

† Victor Hugo, "L'homme qui rit." Paris (1869), Chap. II.

‡ *Ibid.*, Bk. III, Chap. VI.

§ The artificial production of monsters is the theme of "The Artificial Changeling" of John Bulwer (1650–), and is mentioned by Fortunatus Licetus (1577–1657). See J. S. Billings, "History of Surgery." New York (1895), p. 46.

Astigarraga), says Hugo, nineteenth century mothers still intimidated their children with the threat that they would call the *comprachicos* (*"Aguardate, niño, que voy á llamar al comprachicos"*). Victor Hugo was described by Sainte Beuve as "the Frank energetic and subtle, who has mastered to perfection the technical and rhetorical resources of the Latin literature of the decadence." Hugo's citations from

Fig. 7.—St. Vincent de Paul. (1576–1660). From a statue in the Panthéon, Paris, by Alexandre Falguière.)

Conquest may have been mere literary *supercherie*, but his narrative is undoubtedly true to the spirit, if not to the letter of the times, as attested by the endeavors of **St. Vincent de Paul** (1576–1660). This devout man, who had once been captured by pirates off Marseilles and sold into slavery himself, was the noblest champion of the rights of friendless children between Datheus and such men as Lord Ashley, Oastler and Théophile Roussel. In the time of St. Vincent de Paul, an unknown woman of Paris began to collect in her home exposed infants

brought in by gendarmes at night. This eventually proved too large a charitable contract for one person. Many infants died from lack of food, or were exposed again or turned over to charitable persons or institutions. The two servants in the establishment drugged the unfortunates to keep them quiet, and eventually took to selling them to pedlars and mountebanks (*bâteleurs*), who in turn used them for money making purposes. Returning from one of his missions, St. Vincent de Paul actually caught one of the mountebanks or *comprachicos*, of whom Hugo speaks, in the act of deforming the limbs of a child under the walls of Paris. "Barbarian," he cried, "how you deceive me—from the distance I took you for a man!" And snatching the child, he rushed across the city to denounce the infamy. He interested a number of great ladies in his cause, so that a small asylum was established, which was frequently changed for larger accommodations; and slumming parties were organized to gather in exposed waifs. Eventually Louis XIII donated 4000 francs per annum to the charity, and Anne of Austria 8000 francs after his death (1641). In June, 1670, the Foundling's Hospital (Hospice des enfans trouvés) of Paris was chartered and endowed with 12,000 francs by Louis XIV, although its actual annual expenses at that time were 40,000 francs. This led to the systematic conveyance of foundlings to Paris, for the narrow provincial towns would have none of them. Of 2000 infants transported from the provinces in this way, about 75 per cent. died in three months. A new law was accordingly passed imposing a fine of 1000 livres upon any wagoner who brought in an infant for purposes of exposure; and it was decreed that abandoned infants must be taken to the nearest hospital and, if necessary, cared for out of the public funds. To this day, Vincent de Paul is the patron saint of orphans and orphan asylums.*

In seventeenth century England, the rate of **infantile mortality** was also high.

In the time of the Stuarts, London became overcrowded, in spite of the depletion of the population by plague, sweating sickness, and smallpox. The rulers, from Elizabeth to Cromwell, opposed the building of new houses, and the surplus population swarmed to the waterside. "Four-fifths of the population of London," says Forsyth, "were crowded into the alleys and courts of out-parishes such as Wapping, St. Olave's, Lambeth, Whitechapel, and Spitalfields."† In consequence, sometimes half the children born in Restoration England died of disease. Two-fifths of the total deaths were those of infants under two years. In the hot summers of 1669–71, diarrhea killed 2000 babies in eight or ten weeks. Private letters of the period show that the well-to-do were little better off. Traill, im "Social England" speaks of the callous feeling of English parents for children in the Tudor period. Lady Jane Grey told Asham that her child-life was such that she thought herself "in hell."‡ In Stuart England, boy and girl marriages were encouraged.§ The main idea was to get rid of children, by apprenticeship among the poor, by early marriages or a round of visits among the rich. Suffocation of

* Payne, *op. cit.*, pp. 306–311.

† D. Forsyth, Proc. Roy. Soc. Med., London, iv (1910–11), pt. 1, Sect. Dis. Child., p. 117.

‡ Traill, Social England.

§ *Ibid.*

the child by overlying was sometimes resorted to by the unscrupulous. In Congreve's "Love for Love" (act I, sc. 1), produced in 1695, a spendthrift libertine says of the mother of his illegitimate offspring: "She knows my condition well enough, and might have overlaid the child a fortnight ago, if she had had any forecast in her." At birth, the newborn infant was salted (according to Galenic custom), tightly swaddled, dandled for a few minutes each day, kept upright by standing it up to its armpits in a go-cart and taught to walk by means of leading strings. The manual methods of dry-nursing were little known in Stuart England. Maternal and mercenary wet-nursing were the rule. In the English Bills of Mortality, children under two years (the period of teething) are grouped apart. John Pechey (1697) lowers the statutory period of weaning to 1½–2 years after birth, *i.e.*, not before the child had acquired all its teeth. For astrological reasons, a child could not be weaned at the wane of the moon, but preferably when the spring or autumn moon were full. Pap and chicken broth were the earliest artificial foods. To get the child accustomed to these, the mother's nipples were smeared with wormwood or aloes (Pechey). When meat diet was begun, Pechey recommended that it be "first chewed by the nurse."*

On the continent, dry nursing and hand feeding were well-known. The child was fed from pitchers, bowls, and glasses of varied shape, such as that seen in Adriaen Brouwer's "Baby drinking from a Glass" (Leipzig Museum) or the "Family of Fauns" of Jordaens (Nuremberg).

The Seventeenth Century was an age of individualism in thought and research and was more remarkable for monographs on special subjects than for exhaustive treatises. It was the age of the *Arbeit* rather than of the text-book.

Among the twenty pediatric treatises or tracts listed by Meissner are those of Mario Zucarri (Naples, 1604), Joh. Ceckius (Wittenburg, 1604), Jacques Guillemeau (Paris, 1609),† Johan Hucher (Cologne, 1610), F. P. Cascalis (Madrid, 1611), Amthor (*Nasocomium infantile et puerile*, Schleussing, 1638), James Primrose (Rotterdam, 1658), Walter Harris (London, 1689), Philip Grüling (Nordhausen, 1660), Ettmueller (Leipzig, 1675), Christian Lamperti (Merseburg, 1689), Jeronimo Soriano (Saragossa, 1690), John Pechey (London, 1697) and J. J. Loew (Nuremberg, 1699). There is much of pediatric interest in the Maaseh Tuviah of Tobias Katz (1652–1729), which has been described by Levinson.‡ Of these, however, only one need detain us, the *De morbis acutis infantum* of Walter Harris, which became so well-esteemed, that even in the middle of the eighteenth century, it was described as "the best that was ever written on the acute diseases of infants."

Walter **Harris** (1647–1732), of Gloucester, England, was elected fellow of New College Oxford in 1666 and took his baccalaureate degree in 1670. Joining the Church of Rome, he resigned his fellowship and went to study medicine in France, taking his M.D. at Bourges in 1675. Commencing practice in London in 1676, the edict of 1678 compelled him to recant his Catholic professions, after which he was received M.D. at Cambridge. He became an F.R.C.P. in 1682, was twice Harveian orator (1699, 1707), treasurer (1714–17) and delivered the Lumleian lectures at the College of Physicians during

* Traill, *op. cit.*, pp. 116–120.

† For a detailed account of the pediatric treatises of Ceck (1603) Ferrarius (1604), Jacques Guillemeau (1909), James Primrose (1659), John Pechey (1696) and others, the reader is referred to G. F. Still's essay in the Osler Anniversary Volumes, New York (1919). I, 177–191.

‡ A. Levinson, Bull. Soc. Med. Hist. Chicago, II (1917–19), pp. 110–118.

1714–17. He became physician-in-ordinary to Charles II (1683) and, after the Revolution, physician to William III, attending Queen Mary in her last illness (1694). He accompanied King William to Holland, and, while there, published, at Amsterdam, his treatise on the Acute Diseases of Infancy (1689), which was reprinted in 1705, 1720, 1736, 1741, 1745; translated into German (1691), French (1738) and twice into English (1742), holding the field until it was supplanted by the English treatise of Michael Underwood (1784). It is not strange that the best pediatric treatise of the seventeenth century was inspired and patronized by its greatest clinician. Harris was a friend and protegé of Sydenham, who once advised him to read Don Quixote in lieu of medical studies. He was far behind Sydenham in capacity for clinical observation, but, he quotes, with pardonable vanity, an utterance of his master: "I think your little book may be of more service to the public than all my own writings." The pathology of Sydenham was the old Hippocratic pathology of coction of the humors and discharge of the *materies morbi;* but Harris affected the acid diathesis of Franciscus Sylvius, *viz.*, that "all the symptoms of gastro-intestinal disorders owe their origin to acid products in the body" (Abt).

Following the Hippocratic reasoning that diseases, different in different localities, are of but one species with one universal cause, Harris reasons that children's diseases are due to the moisture of their constitution ("puerile humidity"), which "is not apt to degenerate into any putrefaction but the acid." Acid eructations, acid stools abound in infancy, and milk itself turns sour and coagulates when heated. "All the symptoms of infants owe their origin to an acid, as their legitimate parent." The concept of infancy is extended beyond Galen's three months to the fourth year, childhood extending to fourteen. Infants fall sick spontaneously and are as easily cured. The directions for diagnosis, as derived from the nurse's observations, are admirably paragraphed. Our author dilates on the "procatartic cause," *i.e.*, hereditary taints in the parents, the depraved appetites of pregnancy, coition during pregnancy, and maternal impressions. Other immediate causes of infantile diseases are catching cold, thickness of breast milk, the dangers of mercenary wet-nurses, and giving infants meat and wine. Wine is, however, recommended for English girls at the appearance of the menses, even before the Galenic fourteenth year. Disordered digestion, rashes, gripes, flatulence, constipation, vomiting, green stools, fever, convulsions, thrush at teething, are all attributed to acidity, "the tragedy in the lower belly."

Fever in children is "an increase of the natural heat." Lean and scrawny infants are most liable to nervous fevers; fat infants abounding with phlegm, with soft heads, are liable to rickets, whooping cough, thrush and King's Evil; children born of sickly hysterical mothers, to depraved appetites. Harris sharply scores the poor therapeutic resources of his contemporaries, who follow the beaten track of the ancients. Even his pattern, Sylvius, is denounced as "the opiate doctor." He ridicules chemical therapeutics as imposing "the impenetrable hardness of metals" upon "the waxen softness of the infantile constitution." "Mindful of acidity," he upholds Sydenham's practice of purging in fevers, but opposes the use of sudorifics (diaphoretics). His recommendation of "testaceous powders" (oyster shells, crab's eyes and claws, pearls, coral, prepared chalk, Goa stone, etc.) as anodynes and "absorbents of acid" held its own in English practice for over a century. A series of shell-powders and pearl juleps is listed. Rhubarb is better than aloes for infants. Cream of tartar must be unadulterated. Bloodletting is only of use in convulsive coughs or fevers with cough. The exhibition of opiates is only permitted in obstinate vomiting. The Turkish practice of giving lemon

juice in plague and malignant fevers is praised. Teething, thrush, vomiting, diarrhea, convulsions, smallpox, are all to be treated by "testaceous medicines." The work closes with a series of clinical cases, illustrating this theory. Throughout the entire book, semeiology is presented in a free-hand manner, evidently intended for popular consumption. Walter Harris resembles Galen in his vanity about successful cures. His treatise on the venereal disease anticipates some of the historical views of Sudhoff.

The treatise of Harris is really a racy argument in favor of a certain theory of disease and a certain line of treatment. A far greater name in the history of pediatrics is that of Francis **Glisson** (1597–1677), or Rampisham (Dorsetshire), who described the hepatic capsule investing the portal vein (1654), employed suspension in spinal deformities (1660), introduced the concept of "irritability" as a property of all living tissues (1677) and gave the original and classical account of rickets and its association with infantile scurvy in his "*De rachitide*" (1650).* Rickets, first mentioned in the London Bills of Mortality in 1634, was first described in Daniel Whistler's "*De morbo puerili Anglorum*" (1645),† and further in a tract of John Mayow (1669), and in some 12 inaugural dissertations listed by Meissner (pp. 134–135).

In the pediatric handbook (1609) of Jacques Guillemeau (1550–1612), which contains a strong brief for material breast-feeding, the dependence of kyphosis and bending of the ribs upon faulty nutrition is already recognized even though the condition is not labelled (G. J. Still). The *de morbis infantum* (1674) of Franciscus Sylvius (1614–72), the fourth book of his *Praxis Medica*, and translated into English by Richard Gower (1682), illustrates the ideas of Sylvius about gastro-intestinal acidity as the cause of infantile disease. The only new feature is "green stone with gripes," the green sour of Cheyne.

Of original clinical contributions bearing upon pediatrics, Tobias Cober noted the relation between typhus fever and pediculosis (1606), André de Laurens maintained the contagiousness of scrofula (1609), Felix Platter first described "thymus death" (1614), Francois Citois described "Poitou (lead) colic" (1616), Daniel Sennert (1626) and Sydenham (1675) described scarlatina, the latter giving the disease its name, Höfer described cretinism (1657), Jacob Bontius beriberi (1642) and Porchon described Rötheln as "the purples" (1698).

The great Sydenham left classical accounts of many diseases, notably broncho-pneumonia, pleuropneumonia, dysentery (1672), measles (1675), hysteria (1682) and chorea minor (1686), and paid particular attention to children's diseases in his writings.

C. V. Schneider (1660) and Richard Lower (1672) showed that the nasal secretions (*pituita*) come not from the brain (as hitherto supposed) but from the Schneiderian membranes.

Swammerdam demonstrated that the fœtal lungs will float after respiration (1667), which medico-legal test was successfully applied in a court-room case of infanticide by Johan Schreyer (1681).

* See Glisson, "De rachitide." London (1650), pp. 285–286, or the English translation, London (1668), pp. 249–250.

† Norman Moore (in St. Barth. Hosp. Rep., London, xx (1884), pp. 71–82) shows that Whistler's essay, while antedating Glisson's by five years, is really based on second-hand information obtained from Glisson himself, and is otherwise valueless. Gee has shown that the Flagellum Angliæ of Garancier (London, 1647) contains nothing on rickets.

The seventeenth century literature of special monographs on pediatrics is considerable. Meissner lists 18 titles on infant nutrition, 69 on monsters, 2 on infantile jaundice, 6 on aphthæ, 25 on infantile atrophy, 5 on dentition, 29 on intestinal worms, 8 on hydrocephalus, 7 on scrofula, Rolfinck (1637) and Wedel (1684) on gibbous spine, 3 on club-foot, and 114 on smallpox.

During the seventeenth century, the plague, leprosy, typhus and typhoid fever, smallpox, influenza, and dysentery were more or less pandemic at intervals, and swept away thousands. Influenza was first reported in America in 1647 (Jacobi). Diphtheria was confined to Spain and Italy. The first American case occurred at Roxbury, Massachusetts, in 1659 (Jacobi). Yellow fever appeared in New York in 1668, but did not reach Europe until the 18th century. Smallpox broke out in Pennsylvania in 1661 and in Charleston, S. C. (1699). Infantile conjunctivitis was first reported in America in 1658 (Jacobi).

THE EIGHTEENTH CENTURY

In the eighteenth century, the age of theorists and systematists, clinical pathology was founded by Morgagni and Matthew Baillie, experimental and pathological surgery by John Hunter, preventive inoculation by Jenner, improved clinical and instrumental diagnosis by Auenbrugger, Martine, and Currie, public hygiene by Frank, electrophysiology and electrotherapy by Galvani and Volta; embryology by Wolff, medical bibliography by Haller. The age was remarkable for clinicians of essentially practical type, and pediatrics, as a part of internal medicine, was consequently forward. The most prominent pediatrists of the eighteenth century were Friedrich Hoffmann, Rosen von Rosenstein, Armstrong, Raulin, Underwood, Mellin, and Struve. The pediatric literature of this period is marked by original clinical observations from actual case histories, with an occasional eye to morbid anatomy.

Friedrich **Hoffmann** (1660–1742), of Halle, a medical graduate of Jena (1682), and one of the most highly esteemed physicians and medical theorists of his time, published a *Praxis clinica morborum infantum* in 1715, which was translated into German (1741) and followed by another treatise on the principal diseases of infants (1747). Hoffmann also left original contributions on infantile atrophy (1702), mesenteric fever (1728), chlorosis (1730), whooping cough (1732), intestinal worms (1734), diseases of the fœtus in utero (1738), and was one of the first to describe rubella (1740).

Nils Rosen von **Rosenstein** (1706–73), born near Gothenburg, Sweden, on February 1, 1706, being intended for the ministry, studied medicine in secret, against the will of his father, and after working and teaching for eight years, followed by three years of extensive travel, he received his medical degree at Hardwick (1731). Attaching himself to the University of Upsala as a teacher, he succeeded Rudbeck as professor of anatomy and natural history in 1740, later filling also the chairs of physiology and practice, with clinical teaching at the bedside. In 1756, he retired to private practice in Stockholm, and died July 16, 1773. He was physician to the king (1735) and archiater (1745), became a member of the Swedish Academy of Sciences (1739) and was ennobled in 1762. In his travels, Rosenstein had met all the medical celebrities of his time, and his ability, rare experience, and amiable

disposition made him widely known as one of the best physicians of his period.

He published a compendium of anatomy in Swedish (1738), a treatise on domestic medicine, after the fashion of Tissot's *Avis au Peuple*, and some 50 Latin dissertations on the most varied subjects, such as the recording of clinical cases (1728), purification of water (1736), errors in prescribing (1737), equitation (1738), incipient phthisis (1740), gastritis (1740), the possibilities of plastic surgery (1742, smallpox (1751–4) and infantile epilepsy (1754), but his greatest work is his treatise on children's diseases (1764),* which was preceded by a dissertation on infantile diseases (1754). The pediatric treatise was reissued in 1761 and 1771 and was translated into German (1766), Dutch (1768), English (1780) and French (1780). The German translation passed through six editions. Rosenstein described the first epidemic of scarlatina in Sweden (1742–3), also the symptoms of hyoscyamus poisoning in a boy (1744), in which he was the first, after Galen, to call attention to mydriatics. In the edition of 1771, Rosenstein's treatise consists of 28 chapters, the first on wet-nursing, the rest on costiveness, prolapsus ani and other infantile disorders. Pneumatocele, inoculation of smallpox, inoculation of measles, scarlet fever, whooping cough (chin cough), ague, croup, venereal disease, and vermin are the new subjects featured. It is maintained that a child should be suckled on its mother's own milk, as alien milk may make it sick. Lactation is held to relieve mothers of milk fever and leucorrhea. If a wet-nurse is employed, she must be free from diathetic or venereal disease. The sucking-bottle (biberon), if used at all, must be kept clean. The nurse should be purged with suppositories of honey and olive oil, as active purges will injure the child through the milk. Violent emotions in the nurse will produce convulsions in the child. The breast should not necessarily be given when the child cries, but only when its eyes sparkle with anticipation. A modern note is the warning against the neglect of diarrheas falsely attributed to teething, and the insight into the harmful effects of overfeeding (Heubner). Swaddling is condemned. Nursing by the fire-side is dangerous (burns and CO poisoning). Rosenstein never saw a tongue-tied child. Snipping of the frenum is to him a nurse's trick. Violent rocking causes indigestion and vomiting. The meconium is to be purged out by an artificial nipple steeped in manna and sugar. Gripes must be speedily treated, lest they cause convulsions. In teething, the brains of a hare or other animal remedies are ridiculed, and a wolf's tooth is no better to bite upon than crystal or other hard substance. The different diseases and their treatment are given in great detail. No less than fourteen different species of diarrhea are described. The Chinese and Circassian methods of inoculating against smallpox are given, also the folk-custom of "buying the smallpox." Rosenstein used a preservative pill of calomel, camphor, aloes, and guaiac. The general technique of inoculation occupies a chapter of 35 pages. Francis Home's experiments on inoculating against measles are praised. The true cause of smallpox and whooping cough is "some heterogenous matter or seed, which has a multiplicative power." Immunity after an attack is noted. Water-drinking (especially the mineral water at Satra) and eating fish or raw ham may cause helminthiasis. The history of infantile rickets and of infantile cramp in Sweden is detailed, with many case histories. The work abounds in statistical observations and reasoning drawn from the Swedish bills of mortality.

William **Cadogan** (1711–97) of London, a Leyden graduate of 1737, who became an army surgeon, made a wide reputation by his "Essay on the Nursing and Management of Children" (1750), which passed through 10 editions, and his Dissertation on Gout (1771).

The pediatric essay is well written, full of sound sense, did much to substitute loose clothing for swaddling and was a strong argument in favor of maternal

*Rosen von Rosenstein, Underrättelser om barn-sjukdomar och deras bote medel. Stockholm, 1764.

nursing against the spoiling of the child's stomach with panada, caudle, sugared and spiced paps and bread adulterated with alum. Magnesia alba is preferred to the pearl and chalk juleps of Harris. Sensible directions for exercise are given.

In 1767, George **Armstrong,** a London pediatrist, published "An Essay on the Diseases most fatal to Infancy," which passed through three editions (1771, 1777, 1778) to be enlarged by A. P. Buchan in 1808. In 1769, Armstrong established the first pediatric hospital in England, a Dispensary for Poor Children, which was discontinued in December, 1781, from lack of financial support. It was the only institution in which the children of poor parents were received without letters of admission, in cases of desperate illness. During the twelve years of its activity, 35,000 children were admitted and treated. Armstrong published an account of his Dispensary in 1772, but his philanthropy went unrewarded. He died in obscurity.

His "Essay" is a good example of the judicious, common-sense clinical observation of the English practitioner of the time. He notes the neglect of pediatrics in his period, the common byword being that "The best doctor for a child is an old woman." Even John Hunter maintained that nothing can be done for children when they are ill. Armstrong denounces the common neglect of children's diseases, both by parents and practitioners, particularly the impotent plea that children cannot tell of their ailments and doctors are incompetent to prescribe for them. He describes 20 infantile diseases, omitting the acute fevers for lack of ripened personal experience with them. He makes much of "inward fits" (wind-colic) and the hectic fever of teething as new diseases. Constipation is "dry gripes" and diarrhea (cholera infantum) "watery gripes." The chapter on hydrocephalus internus contains three cases, successfully treated, by Matthew Dobson, John Hunter, and Armstrong. Separate chapters are devoted to ophthalmia, lippitudo (blear-eyes), leucoma and tumors after smallpox, and there is a chapter on the treatment of incipient cataract. The chapter on scrofula emphasizes the value of sea-air and sea-bathing for city children and of a dry inland climate for scrofulous children from the coast. Armstrong's favorite remedy is "a milk puke of antimonial wine." He upholds the practice of emesis in infantile complaints, but urges that the bowels should be evacuated before emesis. The importance of early exercise as a preventive of infantile disease is emphasized. the work winding up with some rules on nursing. He first described congenital pyloric stenosis (1777).

FIG. 8.—Robert Whytt (1714–66). (Courtesy of Dr. John Ruhräh, Baltimore.)

In the same year in which Armstrong's Essay appeared, Robert **Whytt** (1714–66) of Edinburgh, eminent in the physiology of the brain and spinal cord, published his "Observations on the Dropsy in the Brain" (1768), which contains the classical account of **tuberculous meningitis.**

Some features of this disease had been vaguely noted by the ancients. Thomas Willis observed the placques and tubercles (1682); Petit confused acute and chronic hydrocephalus (1718); Boissier de Sauvages gave a good description (1763); but Whytt's account individualized the clinical picture, and nothing further was done until Senn of Geneva located the lesion in the pia mater, calling the disease meningitis (1825), W. W. Gerhard established its tuberculous nature (1834) and Rilliet and Barthez completed, in 1843, the differential diagnosis (Ruhräh).*

In the same year, Joseph **Raulin** (1708–84), a provincial French practitioner who came up to Paris about 1750, published a two-volume treatise on the conservation of infancy (1768), which was reissued in three volumes in 1779, and is now valued highly for its historic sidelights on the methods of dry-nursing.

Michael **Underwood** (1736–1820), of Surrey, England, studied at St. George's Hospital (London) under Cæsar Hawkins, saw something of the practice of John Freke, and finished his medical education in Paris. He practised surgery in Great Marlborough Street, and after admission as licentiate of midwifery at the College of Physicians (1784), became attached to the British Lying-in Hospital, and attended the Princess of Wales at the birth of Princess Charlotte (January 7, 1796). He was the last "man midwife." In 1783–8, he published a treatise and some surgical tracts on ulcers of the legs, and, in 1784 his "Treatise on the Diseases of Children." This book took the place of Walter Harris's treatise and passed through several editions, the last being much enlarged by John Bell and Marshall Hall (1842).

The first edition contains the earliest account of **poliomyelitis**. The book, dedicated to the Queen, is written for the laity as well as the profession. Technical terms are avoided. Our author apologizes for his prolixity of style, preferring to make his meaning plain even at the expense of concision. He laments the neglect of the study of infantile diseases, and that, in the past, "little more had been attempted than getting rid of the wild prejudices and anile prescriptions of the older writers." The dangers of high infantile mortality to the body politic are already signalized. Underwood combats Armstrong's idea of giving an emetic to evacuate the meconium and his general preference for antimonial wine over the chalk juleps and absorbent powders of Walter Harris. The new disorders described are those arising from malformations of the heart, "red gum," milk blotches (crusta lactacea), "skin bound" (sclerema, the taut, waxy cold skin of Andry and Tenon), mesenteric fever, marasmus, cardialgia, chicken-pox (Heberden), spasmodic cough, seven-days disease (tropical convulsions), shingles, ringworm, cataract, sty, deafness, gangrenous erosion of the cheeks, psoas abscess, Pott's disease, poliomyelitis, whitlow, boils, chilblains, burns and scalds, tongue-swallowing, epistaxis, umbilical hemorrhage, hydrocele, retained testis, tumefaction of the prepuce, vaginal discharges, poisonous bites, hernia cerebri, tumors of the scalp, spina bifida, harelip, and nævus. Ranula, siriasis, macies and other diseases of the older writers are reviewed, and the chapters on luxations and fractures, varus and valgus in children are the first after Felix Würtz. The book concludes with a chapter on nursery hygiene, or the "non-naturals" (food, air, sleep, etc.), including directions for reviving still-born infants, the necessity of hardening by inuring to cold, and the need for definite exercise in infants. The concluding section on the "passions of of the mind" is an early essay in infant psychology.

A remarkable medical polyhistorian of the Old Vienna School was Joseph Jakob von **Plenk** (1738–1807), who wrote systematic treatises on obstetrics (1769), surgery (1769–83), anatomy (1776), dermatology (1776), ophthalmology (1777), dentistry (1778), bromatology (1784), toxicology (1785), botany (1788–98),

* J. Ruhräh, Med. Library & Hist. Jour., Brooklyn, ii (1904), pp. 153–165, port.

pharmacy (1799–84) and pediatrics (1807).* His *Doctrina* contains a good classification of infantile diseases, treats of asphyxia neonatorum, chorea, tabes dorsalis, gonorrhea, infantile syphilis, pediculosis, malocclusion (dentitio obliqua), and many other complaints in remarkably terse paragraphs, with many prescriptions, concluding with a plate of a deaf and dumb alphabet. Plenk's books, any of them, would be a treasure-trove for medical examiners in easy Latin. He made a reputation by treating infantile syphilis with "mercury-gum," a suspension of mercury in gum arabic.

Gerhard **van Swieten** (1700–1772), leading physician of the Old Vienna School, in his Commentaries on Boerhaave's Aphorisms (1743), contributed notably to the rational pediatrics of his time, particularly in regard to the care and hygiene of infancy. A miscellaneous author of the same type, but less profound, was Christoph **Girtanner** (1760–1800), of St. Gall, Switzerland, a vain, disputatious and somewhat superficial writer, who was one of the opponents of the Brunonian theory of disease, and the author of a three-volume historical essay on venereal diseases (1783–9). He published (1794) an essay on children's diseases,† which, in the opinion of contemporary pediatricians, is showy and specious. Christoph Jakob **Mellin** (1744–1817), a Jena graduate of 1766, published on account of the epidemic of whooping-cough at Langensalza in 1768–9 (1770), and a pediatric treatise *Der Kinderarzt* (1787). The famous Christoph Wilhelm **Hufeland** (1762–1836), of Berlin, published two tracts, addressed to mothers, on the hygiene and physical education of children (1794–9) and a treatise on the hygiene and diseases of the fetus in utero (1827). A Handbook of Children's Diseases, for parents and preceptors, was published by Christian August **Struve** (1767–1807), of Görlitz, in 1797.

The pioneer of **school-hygiene** was the celebrated Johann Peter **Frank** (1745–1821), in his "Complete System of Medical Polity" (1777–88), the first systematic treatise on public hygiene, which contains separate chapters on the hygiene of infancy, lactation, wet-nursing, foundling asylums, the overtaxing of childhood and the hygiene of education. The chapter on school-hygiene contains practically everything brought out later by Virchow and Hermann Cohn. The proper lighting, heating and ventilation of the school-room, the proper slanting and adjustment of desks and benches in relation to visual requirements, are all features of this wonderful book.

The miscellaneous literature of pediatrics in the eighteenth century is extensive and difficult to classify. The reader is referred to the arrangements by subjects in Meissner's sterling bibliography. Nearly every important physician of the period wrote something on pediatric subjects. Stahl wrote on the requisites of a good wet-nurse (1698), worms (1698), ascites (1702), diseases of children (1705), medical gymnastics (1708), smallpox and measles (1709) and cachexia (1710); Haller on monsters (1745–53), spinal deformities (1748–9) and congenital hernia (1749); Roederer on smallpox (1756), apparent death (1760), infantile atrophy 1758), tænia (1760) and rickets (1788); Joh. Peter Frank on education (1766), rickets (1788) and gastric fever (1799); Wrisberg on fetal respiration (1763), monsters (1791–9), undescended testicles (1799), apparent death (1780) and inoculation; Baumes on convulsions and colic (1781), epidemic jaundice (1788–1806), and scrofula (1789–1805).

In 1774–6, Hugh Downman (1740–1809), a physician of Exeter, England, published "Infancy: a Poem," in three parts, which was reprinted several times down to 1809.

The literature of **smallpox, variolation and vaccination** is enormous. In the period preceding the publication of Jenner's Inquiry (1798), variolation or inoculation, introduced from the Orient by Timoni (1713) and Pilarini (1715), was taken up by Lady Mary Wortley Montagu in England (1721) and by Zabdiel Boylston

* J. J. von Plenk, "Doctrina de cognoscendis et curandis morbis infantorum," Vienna (1807).

† C. Girtanner, "Abhandlung über die Krankheiten der Kinder." Berlin 1794).

in Boston (1721), and after a period of stagnation (1727–43), was revived by the success of Kirkpatrick in South Carolina (1743), Robert and Daniel Sutton (1760) and William Watson (1768) and Angelo Gatti (1769) in Paris, and actually attained the status of scientific preventive inoculation during 1764–98. Variolation is preventive inoculation against smallpox by means of virus taken from the human subject. In folk-medicine, the end was attained by the East-European custom of "buying the smallpox," *i.e.*, by bringing coins moistened with virus from the scabs, purchased in open market, into contact with skin. The usual procedure in the middle of the century was inoculation by puncture or incision, preceded by bloodletting and purging. Sutton substituted a sensible strengthening regime for this depletion of the patient, and Kirkpatrick attenuated the virus by passing it through several human subjects, diluting with water, etc. Gatti showed that apparent reinfection was due to mixed infection of other exanthems (scarlatina, measles). In this period of experiment in preventive inoculation prior to Jenner, children played a prominent part. Timoni inoculated his daughter (1707), Lady Montagu her infants (1718–21), Boylston his son (1721), Dimsdale made a fortune by inoculating Catherine of Russia and her son (1768), and Ingen-Housz inoculated three of the royal family of Austria (1768), after preliminary experiments upon 200 children of the Viennese suburbs. Jenner made his first experiment in vaccination upon a country boy, James Phipps, on May 14, 1796. The great danger of variolation was that the inoculated person became, through the scab, a true smallpox carrier, and the inoculation was sometimes fatal. Vaccination, with little mortality and no possibility of convection, carried the day, and variolation was declared a felony by Act of Parliament in 1740.*

Of the many infantile diseases which were first described and individualized by the clinicians of the eighteenth century, **diphtheritic croup,** variously known as angina puerorum, angina polyposa, angina maligna, angina suffocativa, angina membranacea, syncope angionosa, cynanche trachealis and cynanche stridula, became better understood through the careful accounts of John Fothergill (1748), J. B. L. Chomel (1749), John Huxham (1757), Francis Home (1765), and Samuel Bard (1771). In 1736, John Freke described myositis ossificans progressiva in a boy. Francis Home (1719–1813) made his experimental inoculations of **measles** in 1759. John Millar (1733–1805), in his "Observations on the Asthma and on the Hooping Cough," described **thymic asthma** (1769). J. Z. Platner reviewed the Hippocratic doctrine of the tuberculous nature of gibbous spine, with an interesting plate (1744). **Pellagra** was described by Gaspar Casal (1735–62) and Francis Thierry (1755) and named by Francesco Rappoli (1771). Robert Hamilton emphasized the orchitic lesion in **mumps** (1761). Mestivier operated for **appendicitis,** and described the true lesion, from a pin (1759). Heberden described **varicella** (1767), Whytt **tuberculous meningitis** (1768), John Rutty **relapsing fever** (1770), Percival Pott and J. P. David pressure paralysis from **spinal caries** (1779), Sir George Baker lead-poisoning in children (1784), Hezekiah Beardsley **congenital pyloric stenosis** (1788), Malacarne (1788) and Foderé **goitre** and **cretinism** and Soemmerring **achondroplasia,** with a fine plate (1791). John Machin (1753), Henry Baker (1753) and Tilesius (1802) traced ichthyosis hystrix through successive generations of the Lambert family.

American pediatrics in the 18th century was more remarkable for original descriptions of diseases than for definite contributions to the subject.

The graduating thesis of the celebrated Charles Caldwell (1772–1852) at the University of Pennsylvania (1796), attempts to show that internal hydrocephalus, diphtheria (cynanche trachealis) and infantile diarrhea were only symptomatic of fever in infants (S. S. Adams).† The best individual contribution is the section

* A. C. Klebs, "Die Variolation im achtzehnten Jahrhundert." Giessen (1914).

† S. S. Adams, The Evolution of Pediatric Literature in the United States, Tr. Am. Pediat. Soc. N.Y., IX, (1897)., 5–31.

on diseases of children in Lionel Chalmers' "Account of the Weather and Diseases of South Carolina" (1776), which treats of worms, convulsions, thrush, otorrhea, catarrhal peri-pneumonia, nervous asthma, quinsies, angina, and whooping cough (Jacobi). The most remarkable things were the long series of American tracts on smallpox, inoculation and vaccination (1721–1802), the accounts of diphtheritic and other anginas by William Douglas (1736), Cadwallader Colden (1757), Samuel Bard (1771), Jabez Fitch (1736), I. Dickinson (1740), Peter Middleton (1780), Richard Bayley (1781), of malignant pleurisy by John Bard (1749), of yellow fever by John Bard, Colden (1743), Mitchell (1741), William Currie (1792), Benjamin Rush (1796) John Lining (1799), and of congenital hypertrophic stenosis by Hezekiah Beardsley (1788). **Samuel Bard's** account of diphtheria was translated by Bretonneau in his great work of 1826, highly praised by Jacobi for its descriptions of the pharyngeal, tracheo-laryngeal, and cutaneous manifestations, and pronounced "An American classic of the first rank" by Sir William Osler, who also reprinted Beardsley's paper on congenital pyloric stenosis in 1903. Benjamin **Rush** (1745–1813), the greatest American clinician of his time, described cholera infantum (1773), dengue (1780), influenza in children (1789–91), and the thermal fever occasioned by the drinking of cold water.

Jacobi, in his "History of American Pediatrics before 1800,"* says that **measles** appeared in New England in 1713, with many later outbreaks; epidemics of **influenza** from 1647 to 1789 were described in old records; **scarlatina** broke out in Philadelphia and Salem, Mass., in September, 1783, through New England in 1784, these epidemics lasting five years, and again in Philadelphia (1789–91) and the Northern States (1792–3). **Diphtheria,** first reported in New England in 1659, appeared at Kingston, N. H., in 1735–6, as the angina ulcusculosa" of William Douglas.

The rate of **infant mortality** was dreadfully high in the 18th century.

Hand-feeding had come into fashion, and Sir Hans Sloane stated that the mortality of dry-nursed infants was nearly three times that of the breast fed. When patients at the British Lying-in Hospital were required to suckle their own infants, the mortality fell to 60 per cent. "Death from want of breast milk" was the common entry in hospital records.

Of 10,272 infants admitted to the Dublin Foundling Hospital during 21 years (1775–96), only 45 survived, a mortality of 99.6 per cent. Of 31,951 infants admitted to the Paris Foundling Asylum during 1771–77, 25,476 (80 per cent.) died before the end of their first year (Forsyth). From tables constructed from the London Bills of Mortality covering the 100 years ending 1829, the death rate per 100 of children under 5 was: 1730–49 (74.5); 1750–69 (63); 1770–89 (51.5); 1790–1809 (41.3); 1810–29 (31.8) (Edmonds).† Malthus said that to multiply infant hospitals and foundling asylums was the surest means of checking the growth of the population. *Ici on fait mourir les enfans* was the inscription proposed by a French critic for the Parisian institutions of this kind. Outside the hospitals, the evils of baby-farming and of mercenary wet-nursing (in France) were prominent factors. The English wet-nurses of the period got 25 guineas a year, which led many young women to have illegitimate children, who were abandoned at foundling hospitals or died through baby-farming. In France, the evil was the same.

In Georgian England, mixed feeding in the shape of water-pap (moistened bread), baked flour pap, weak-broth, beef-tea, bread panada sweetened with Lisbon sugar, French bread, Uxbridge rolls, and even the minced meat of turtle-doves, larks, thrushes, ortolans and chickens, was preferred to cow's or goat's milk. Of these infant foods, William Cadogan observes in his Essay on Nursing (1750) that "their paps, panadas, gruels, etc., are generally enriched with sugar spice or a drop of wine; neither of which they ought ever to taste," and he adds

* A. Jacobi, Collectanea Jacobi, New York, iii (1909), pp. 1–40.

† J. R. Edmonds, Lancet, London, i (1835–6), pp. 690–694. Cited by A. K. Chalmers.

that "The London bakers are suspected of putting alum into their bread, which would be very pernicious to infants; therefore rusks, or the biscuits called tops-and-bottoms, or rice may be used instead of it." Small beer was given to children, and even Underwood recommended a little red wine, as preventing rickets in infants learning to walk. Struve recommended three beaten yolks of eggs in a sweetened quart of beer for infants after weaning.* Of suckling apparatus, the cowhorn (known on the continent from the 13th century) became common in England about 1783 and was praised by Heberden. The glass nursing bottle, the pap-boat and pap-spoon did not come into vogue until the 19th century. On the continent, as we have seen, all these methods had long been known. Porcelain flasks are mentioned by Raulin (1769). Retort-shaped glass flasks were introduced by Baldwin (1781). Raulin and Rau also recommended boat-shaped cups and flat glasses with beaks, shaped like a Roman lamp. The boat was first mentioned in England by Armstrong (1792) and held 3–4 fluid ounces. Although ridiculed by Girtanner, who inquired whether the "boat" was a shallop or a warship, this form survived as the "Vienna ship" of Rau, and was used even when Ammon, in 1882, condemned it as making the child swallow rather than suck. The "Cadogan cans" were used in England, but boats and cans proved dangerous when made of tin. Cone-shaped glass flasks, provided with a nipple, were used up to 1875. Peter Camper mentions a tube reaching to the bottom of the bottle (1777), a precursor of the modern sucking tube (Brüning).†

In 1761, Jean-Jacques **Rousseau** published *Émile*, a tract on the education of children, which was condemned and denounced by the Archbishop of Paris for its irreligious tendencies (1762). The part which immediately concerns us is the long introductory passage in Book I, which deals with the hygiene, and nutrition of infancy. In this passage, which is virtually a popular treatise on pediatrics, the dangers of mercenary wet-nursing and swaddling infants are set forth, women are exhorted to nurse their own children, and along with much that is silly and inept, there is much that is sound and sensible. The book is a tedious one to read, on account of its multifarious rhetorical declamation and the foolish, false sentiment of the period. Rousseau, himself, is said to have consigned his five illegitimate children to a foundling asylum. He was a striker of attitudes, his life, as Carlyle said, "a long soliloquy." Medicine, in particular, he ridicules as a useless fashionable cult, "the amusement of the idle, aimless people." But his revolutionary ideas about "return to nature" appealed to the people of his time, and the centric theme of his argument—"*point de mère, point d'enfant* did much to awaken French mothers to the obligation of breast-nursing and caring for their own offspring.

Émile engendered a large crop of literature on the dangers of mercenary wet-nursing and swaddling, such as the *Avis aux mères* of Madame Le Rebours (1767), the *Dangers du maillot* of Lascazes de Compayre (1778), the *Observations sur l'allaitement des enfants* of Levret (1781) and the pamphleteering of F. A. Weiz (1782) and K. Strack (1782–9) on the trade-tricks of wet-nurses. The *Nomothelasmus* of Geronomino Mercuriali was fished up and printed at Padua in 1788. Rousseau's propagandism against wet-nurses which had even been preceded by Linnaeus (*Nutrix noverca*, 1762), and others, found its echoes at Vienna in the letters of Maximilian Stoll (edited by Eyerel, 1788), in the pamphlets of Cadogan

* D. Forsyth, Proc. Roy. Soc. Med., London, iv (1910–11), Sect. Dis. Child., pp. 121–126.

† H. Brüning, "Geschichte der Methodik der künstlichen Säuglingsernährung." Stuttgart (1908), pp. 93–103.

(1750) and Benjamin Lara (1794) and in Wilmington in "The Female Monitor" of H. Smith (1801).

While children were cleverly and effectively portrayed by Reynolds, Gainsborough, Raeburn and other painters of the period, the only picture of special pediatric interest is the copperplate from Hogarth's "Mariage à la Mode" (Plate III), representing a dissolute parent bringing his syphilitic child to a quack. That the primitive preference for male offspring was still ascendant is evidenced in the engraving of J. J. Moreau the younger, entitled *"C'est un fils, Monsieur!"* The

FIG. 9.—J. M. Moreau *le jeune*: "C'est un fils. Monsieur!" (Preference for male offspring in the 18th century.)

glorification of the male was, in fact, to reach its apogee in the biological writings of the Bavarian naturalist Lorenz Oken (1779–1851), who declared that "Ideally, every child should be a boy." Lecky, in his histories of England and Ireland in the eighteenth century records that infanticide was common in Scotland and very rare among the Irish in this period. Of cruelty to children, an outstanding instance may be recalled in the childhood of Frederick the Great and his sister, the Margravine of Bayreuth. Had the father of these children been less of a brute, the present European war might never have occurred.

In the eighteenth century blind beggars were objects of ridicule. They were tricked out with asses' ears, peacocks' tails, and pasteboard spectacles to be utilized in burlesque concerts for popular amusement in public places. Diderot was thrown into the Bastille for suggesting that they might learn to read and write by the sense of touch. Rousseau suggested a system of embossed printing for the blind, and Valentin Hauy (1745–1822) founded an *Institute Nationale* for young blind persons in 1785, which was successful. The *Lettres sur les aveugles* of Diderot (1749) and the *Essai* of Hauy (1786) are the early landmarks of this movement. The pioneer

of **deaf-mute instruction** in France was the Abbé Charles-Michel de l'Epée (1712–89) who founded the first school for deaf-mutes in Paris (1775), published a method of instruction (1784), and left an unfinished dictionary of the deaf and dumb signs, which is said to have been completed by his successor, the Abbé Cucurron Sicard. In America, the earliest pioneer of the deaf-mute instruction was Francis Green (1742–1809), of Boston, in his *Vox oculis subjecta* (London, 1783).

THE NINETEENTH CENTURY

In reviewing the late pediatric literature of the nineteenth and twentieth centuries, no attempt will be made to analyze or criticize the basic texts. To furnish a critical inventory of the contents of the older writings is conceivably and admittedly a function of bibliography. To render a detailed account of the vast pediatric literature of recent times is a fitting task for some future specialist in children's diseases. The outstanding text-books before the time of Heubner and Finkelstein were those of Billard, Rilliet and Barthez, Bouchut, Charles West, Bednar, Henoch, Gerhardt and Rotch, with the larger systems of Gerhardt, Keating, Starr, Pfaundler and Schlossmann, Grancher and Comby, Brüning and Schwalbe. In England, Underwood held the field up to the time of Charles West. The names of Bednar and Henoch mark the rise and predominance of modern German influences. American pediatrists, before the advent of the metabolists, have pursued an independent course. The most favored treatises have been those of J. Lewis Smith, Jacobi, Rotch, and Holt. In this period, infantile surgery and orthopedics became distinct specialties; the movement for the hygienic inspection of schools and school children was inaugurated by Virchow, Chadwick, and Hermann Cohn; juvenile anthropometry, ethnology, psychology, and criminology began to be studied; and the interest in infantile mortality as a phase of national depopulation was the starting point of the new social science of infant welfare. The spirit of the eighteenth century still informs the pediatric literature before the time of Billard, particularly in the remarkable books of Cheyne, Heberden, and John Clark.

John **Cheyne** (1777–1836), of Leith, Scotland, a medical graduate of Edinburgh (1795), entered the army as a surgeon of artillery. He led a frivolous, dissipated life until he settled down to solid practice at Leith Fort in 1799, devoting himself to infantile and contagious diseases. In 1809, he settled in Dublin, became physician to Meath Hospital (1811) and physician general to the forces in Ireland (1820), which was then esteemed the highest medical honor in that country. In 1802–8, he published his Essays on the Diseases of Children, dedicated to John Rollo, and in 1809 his classic on "The Pathology of the Membranes of the Larynx and Bronchia," beautifully illustrated with colored plates by Charles Bell. In 1821, he described the Dublin fever epidemic of 1817–19. During 1810–11, he made only three guineas in practice, but at the height of his career he commanded £5000 yearly. His health failing in 1825, he retired to his estate at Sherington, Buckinghamshire, and died on January 31, 1836, leaving a posthumous essay on insanity (1843), prefaced by an autobiography. Cheyne's pediatric essays comprise three studies of cynanche trachealis (croup), the bowel complaints of children, and acute hydrocephalus. These are scholarly performances, replete with historical details and original clinical histories with postmortem findings. The essay on bowel complaints is devoted to biliary disorders, in particular, infan-

tile jaundice and the "green seour" (green stools with griping convulsions) and the disease called "weaning brash" in Scotland, or *atrophia ablactorum* (green stools with eachexia). The essay on hydroeephalus aeutus, dedicated to Charles Bell, is a eontinuation of the monograph of Whytt, and sharply eriticizes the views of Benjamin Rush. Case histories and autopsies are earefully recorded.

Fig. 10.—John Cheyne (1777–1836).

In 1803–12, Karl Bernhard **Fleisch** (1778–1814), of Cassel, published a four-volume Handbook of Children's Diseases containing a series of exeellent bibliographies, which undoubtedly constitute the germ of Meissner's ehronologieal lists of 1850. Fleisch is said to have anticipated Czerny in preseribing long pauses between the suckling periods of the nursing infant.*

William **Heberden** (1767–1845), of London, son of the greatest English clinician between Sydenham and Bright, was an Oxford graduate of 1795, physieian to St. George's Hospital (1793–1803), and physician to the King and Queen. He attended George III in his last illness. The younger Heberden inherited his father's elassical tastes, and made translations of Cieero's Letters and Plutareh on Brotherly Love. In 1804, he published a Latin Epitome of pediatries,† whieh he himself translated into English (1805). Heberden's Epitome, the work of one of the ablest Greek and Hebrew seholars of his time, is of all pediatric treatises the most remarkable for classic purity and simplieity of style. In a tiny volume, the size of a child's primer, the hygiene and therapy of infaney and some 52 infantile disorders are set forth in 61 brief ehapters, which have all the terse quality of the Hippocratic aphorisms. The very titles—"still-born," "wind on the stomach," "locked jaw," "watery head," "sore ears," "seald head"—suggest the elinician's preferenee for the plain English of every day praetice. Each chapter goes straight to the point, with nothing of the eircumloeution of Harris or Underwood. This unpretentious booklet forms a stable bridge between the pediatries of yesterday and of classieal antiquity.

Adolph **Henke** (1775–1843), a famous medical juriseonsult of Erlangen, published a Handbook of Pediatrics (1809), whieh reaehed its fourth edition in 1837, a Poeketbook for Mothers (1810), and monographs on developmental diseases (1814), internal inflammation in infants (1817) and pulmonary docimasia (1821).

John **Clarke** (1761–1815), of Wellingborough, Northamptonshire, lecturer on midwifery at William Hunter's school in Windmill Street and at St. Bartholomew's Hospital, was the leading obstetrician of London after Hunter's day, but later devoted himself to a West End praetice in gynecology and pediatrics. He published two volumes of obstetrie essays (1788–93), and in 1815, his "Commentaries on some of the most important Diseases of Children" (Part I). The diseases featured are disorders of dentition, eonvulsions, phrenitis, idioey, paralysis, and epilepsy. These Essays contain the first account of laryngismus stridulus and its assoeiation with tetany (pp. 86–97).

John Bunnell **Davis** (1780–1824), being foreibly detained in France by Napo-

* Langstein and Meyer, "Säuglingsernährung und Stoffweehsel." Wiesbaden (1910), p. 54, footnote.

† Heberden, "Morborum puerilium epitome." London (1804). "Epitome of Infantile Diseases." London (1805).

leon, took his M.D. at Montpellier (1803), after which he was released through Corvisart's generosity. Returning to England, he took another M.D. at Edinburgh (1808), and after serving as an army surgeon at Ipswich, settled in practice at London (1816), where he helped to found, on St. Andrew's Hill, the Universal Dispensary for Sick and Indigent Children (1816), the first institution of its kind. Davis's Annals of this Dispensary (1821), during the four years of its activity, is perhaps the first report of a children's hospital. He published a Cursory Inquiry into the principal causes of mortality in children (1817), in which he was the first to advocate visitations of trained nurses for instructing ignorant and indigent mothers in the art of infant nutrition and hygiene.

A great step forward was taken when Pierre **Bretonneau** (1771–1862), the eminent clinician of Tours, published his monographs on the contagious nature of typhoid fever (1819–29) and diphtheria (1826). Bretonneau described and understood the lesions in Peyer's patches (1820), predicted that typhoid fever would some day be distinguished from typhus (1821), and clearly stated the doctrine of specificity in disease (1826–55). He was a kind of specialist in diphtheria. In his monograph of 1826,* he synthetizes all the diseases described by so many various names under one generic term "*diphthérite*," which he introduced, elucidates its pathology, describes the cutaneous and vulvar forms and concludes with historical extracts from Ghisi (1740), Samuel Bard (1771) and the older writers. This book contains the first successful case of tracheotomy in diphtheria, which Bretonneau performed on the child Elizabeth de Puységur, on July 1, 1885,† after five successive failures.

Johann Christian Gottfred **Joerg** (1779–1856), a Leipzig M.D. of 1805 and a pupil of the obstetrician Boër, wrote much on gynecology and obstetrics, early orthopedic treatises (1810–12), a handbook of pediatrics (1826) and a monograph on pulmonary diseases from imperfect respiration in the newborn (1832).

Joerg's pupil, Friedrich Ludwig **Meissner** (1796–1857), who graduated in medicine at Leipzig (1819), erected an obstetrical polyclinic there in 1838 and made a great reputation in obstetrics and gynecology. He published a work on superfœtation (1819) a two-volume treatise on pediatrics (1828, 3d ed. 1845) and six volumes of "*Forschungen*" (1826–33), three of which are devoted to a review of pediatric literature from 1801 to 1832. This led to his invaluable *Grundlage* or bibliography of pediatrics (1850),‡ which consists of a strictly chronological arrangement of books and monographs by subjects, under 90 subdivisions, in other words, a miniature Index Catalogue of pediatric literature from 1472 to 1849.

In 1828, Frederick **Corbyn**, a surgeon in the Bengal Army, and editor of the *Indian Journal of Medical Science* (1835–42), published his valuable work on the management and treatment of infantile diseases in India, illustrated by interesting tinted plates. The subject was admirably summarized in a little book of pocket size, the "Hints" (1844) of Henry Hurry **Goodeve** (1807–84), another Bengal Army surgeon, which has been a vade-mecum in Indian pediatrics ever since, reaching its eighth Calcutta edition in 1886. Another treatise on tropical pediatrics was that of the anthropologist F. A. C. **Waitz** (1798–), of Samarang, Java, published simultaneously in Dutch and English (1843, 2d ed., 1866). This was followed by the treatises of S. C. Amesburg (1886), G. Montagu Harston (1912), and others.

In 1833–37, the Austrian Army surgeon Franz Josef **Mezler** von Andelberg (1787–1858) published a valuable collection of pediatric essays,§ selected from the best writers, such as Bischoff on the examination of the sick child, Fenner on pediatric etiquette, Billard on the semeiology of the infant's cry, Hufeland on

* Bretonneau, "Des inflammations spéciales du tissu muqueux et en particulier de la diphthérite." Paris (1826).

† Bretonneau, *op. cit.*, pp. 300–325.

‡ F. L. Meissner, "Grundlage der Literatur der Pädiatrik." Leipzig (1850).

§ Mezler, "Sammlung anserleserner Abhandlungen über Kinderkrankheiten." Prague (1833–7).

general principles, fetal diseases and cephalhematoma, Guibert on pericarditis, and Basedow on psorophthalmia.

The most important pediatric treatise of this early period was that of Charles-Michel **Billard** (1800–32) of Pelouaille, France, who studied medicine at the École secondaire of Angers (1819–23) and came up to Paris in 1824, having acquired the funds by a prize essay on the gastro-intestinal mucous membrane (1825). He was very poor, had to eke out his living by translations, journal articles and other hack-work, and did not get his medical degree until 1828. In the same year he published his treatise on the diseases of newborn infants and sucklings,* with an atlas, (1828, 3d ed. 1837), which was translated into German by Meissner (1829).

This work, the fruit of Billard's internship at the Hospice des enfants trouvés (1826–28), where he made many autopsies, was inspired by his reading of Morgagni, and indeed, is eminently representative of the French medicine of Bichat's and Laënnec's day, in which clinical notations were correlated with autopsy findings. It is, in fact, the first pediatric treatise in which a uniform classification of diseases is attempted from a definite standpoint, *viz.*, that of the pathological lesion. The book begins with a careful consideration of the attitudes, coloration of the skin, height and weight, semeiology of crying, facial expression, and pulse in the newborn. The diseases are classified under the following categories: skin (including exanthematous fevers, cancer, leprosy, anthrax, etc.), digestive apparatus, viscera, air passages, circulation, cerebro-spinal system, locomotive system, generative organs, lymphatics, eye, infantile jaundice, alterations of the blood, abnormities and congenital diseases, with medico-legal considerations, and 87 case histories. This is the first classification of infantile diseases of any importance, for many titles listed in the older treatises are not diseases but symptoms. To the second and third editions, Billard's graduating dissertation on the jurisprudence of viability (1828) was added. The work shows considerable research in foreign literature, its author having learned German, English and Italian in order to write it. After its publication, with a brilliant Parisian career in prospect, Billard, a modest nature, returned to Angers with his wife and child, and died of phthisis on January 31, 1832.

The microscopist Alexandre **Donné** (1801–78), of Paris, who first observed the blood platelets (1842), published an important treatise on milk (1837), with plates, and two books of advice (*Conseils*) to mothers and families on the rearing of infants and children (1846, 1864), all of which were translated into German.

Francois-Louis-Isidore **Valleix** (1807–55), of Toulouse, began the study of medicine at Paris in 1826, became interne at the Children's Hospital (1830) and graduated with a dissertation on slow asphyxia in the newborn (1835). He later served at the Bureau central (1835) and other hospitals, and died in 1855 of diphtheria, contracted while treating a sick child. During his student days in hospital, he gathered the materials for his *Clinique des malades des enfants nouveaunés* (1838), which follows the tendency established by Andral (*Clinique médical*, 1829–33), carried to the highest point of perfection by Trousseau, and latterly revived by Richard Cabot, Morse, and others, *viz.*, the exposition of the data of internal medicine by means of clinical case histories, rather than by a formal textbook. This tendency characterized the first attempt at a pediatric periodical, the *Clinique des hôpitaux des enfans*, (1811, 1841), as also V. Stöber's *Clinique* from the pediatric section of the Strassburg Faculty (1841), the *Clinique* of A. Becquerel and Vanier (1843–4), the reports from the children's hospitals at Frankfort and Dresden (1845–6), and the later clinical collections of Rittershain and others. Valleix also published a treatise on neuralgia (1841), in which his name is eponymically preserved in "Valleix's points."

* Billard, "Traité des maladies des enfans nouveaux-nés et à la mamelle." Paris (1828).

The three outstanding pediatric text-books after the time of Billard were those of Rilliet and Barthez, Bouchut, and Charles West. Frédéric **Rilliet** (1814–61), of Geneva, began his medical studies in Paris (1833), and, with his friend Antoine-Charles-Ernest **Barthez** (1811–91), a Paris graduate of 1839, turned his attention to pediatrics. He graduated with a dissertation on typhoid fever in children (1840), and later returned to Geneva, where he described the local epidemics of measles (1847), mumps (1850) and cholera (1856). Before graduation, he had begun, with Barthez, the famous *Traité clinique et pratique des maladies des enfants*, which, after seven years' work, was completed in three volumes (1838–43), crowned by the Academy of Sciences and Academy of Medicine, authorized by the Council of Public Instruction, and passed through three editions, the third (1884), being completed by Barthez and A. Sanné, a laureate of the Academy of Medicine, who was noted for his treatise on diphtheria (1877) and his graduating dissertation on tracheotomy in croup (1869).

This great work began definitely with a volume on infantile pneumonia in 1838. The first edition (1843), follows the general lines laid down by Billard and contains many case histories. In the second edition (1861), the case histories begin to disappear, and the treatise is enriched by historical studies of the different diseases and by the valuable interim clinical studies of the authors, in particular, Rilliet on tuberculous meningitis (1846), intestinal hemorrhage of the newborn (1848), sclerema (1848), essential paralysis (1851), poliomyelitis (1851),* encephalopathic albuminuria (1853), dyspepsia and apepsia (1854), dilatation of the stomach (1858) and Rilliet and Barthez on the history of typhoid fever and the anginas (1840–41), tuberculosis of the bronchial glands (1840–41), chronic hydrocephalus (1842), arachnoidal hemorrhage (1842), the history of bronchitis and bronchopneumonia (1851) and the signs of chronic pleurisy (1852–3). In the third edition (1884), sometimes called "Barthez and Sanné," the case histories have entirely disappeared, after the modern fashion, and the details of historical development of different diseases in children, with the valuable footnotes, make this edition, in the words of Ruhräh, "a perfect treasure-house of information,"† a book for the desk of all learned pediatrists. The account of poliomyelitis occurs on p. 545 of Vol. II of the second edition (1861). Much attention is paid to gastritis and "softening of the stomach" described by Jaeger (1786), which John Hunter regarded as post-mortem auto-digestion, which Trousseau defined as a "choleriform enteritis" with post-mortem gastric changes, and which the earlier American pediatrists termed cholera infantum or "summer complaint" ("cholerine" of Bourgeois).

Ernest **Bouchut** (1818–91), a Paris graduate of 1842 and physician to the Hôpital des enfants malades (1872), was a pioneer in the use of the ophthalmoscope in the diagnosis of nervous diseases (1865) and the jurisprudence of death, wrote an important book on neurasthenia (*Du nervosisme*, 1860) a good history of medicine (1864, 1873), an atlas of ophthalmoscopy and cerebroscopy (1876), treatises on diagnosis (1883), seminal vitalism (1888) and several important books on pediatrics, notably those on the diseases of children (1845, 6. ed., 1873) and the hygiene and nutrition of infants (1845, 5. ed., 1866). In 1858, he published important researches on the laws of infantile mortality,

* Rilliet, Gaz. Méd. de Paris, vi (1851), 3d s., pp. 681, 704.

† J. Ruhräh, "A Manual of the Diseases of Infants and Children," 3d ed., Philadelphia (1911), p. 514.

and, in 1884, a pediatric Clinique which consists of 60 clinical lectures, like those of Andral, Valleix and Trousseau. In 1858, he outlined a plan for intubation of the larynx, which met with such rebuffs from the Academy of Medicine that he abandoned it.

His *Manual pratique* of 1845, treats of the hygiene and nutrition of infancy, the semeiology of infantile diseases, after the manner of Billard, with sections on diseases of the mouth, abdomen, nose, larynx, chest, exanthemata and skin diseases, eyes and rickets, illustrated by clinical cases. The sixth edition (1873) is a massive volume of 1092 pages. Although Bouchut was a famous medical historian in France, his pediatric treatise contains little history, but his book on infant hygiene is illustrated with interesting pictures of nursing bottles, bathing, walking chairs, jumpers and gymnastic apparatus.

FIG. 11.—Ernest Bouchut (1818–91). (Surgeon General's Library.)

The greatest English pediatrist of his time, and perhaps the most genial practitioner of the art who ever lived, was Charles **West,** of London (1816–98). The son of a Baptist lay preacher, West was prevented by his father's religious prejudices from entering Oxford, and after a medical apprenticeship with Mr. Gray at Amersham, where he became exceedingly skilful in compounding medicines, he studied at Bonn, Paris, and Berlin, where he graduated M.D. with an illustrated dissertation on the female pelvis (1837). While waiting for practice in London, he put in a summer at the famous Rotunda Lying-in Hospital of Dublin and at Meath Hospital under Graves and Stokes (1838). In 1842, he was appointed physician to the Infirmary for Children in Waterloo Road and, in 1845, lecturer on midwifery at the Middlesex Hospital. In the meantime, he had written much and had translated Naegele on Obstetric Auscultation (1839) and Johannes Müller on the structure of cancer and tumors (1840). In 1847, he gave a course of lectures on diseases of children at Middlesex Hospital, the substance of his great work. During 1848–60, he delivered lectures on midwifery at St. Bartholomew's Hospital, which, with his published lectures on diseases of infancy and childhood (1848) and on diseases of women (1856–8), were the foundation of his fame. In 1852, West established the Children's Hospital in Great Ormond Street, where he was senior physician

until 1875. What he did for this institution will be described in the section on Hospitals. Admitted to the Royal College of Physicians in 1842, he became fellow (1848), censor (1863) and senior censor (1870) and delivered the Croonian lectures on ulceration of the os uteri (1852), the Lumleian lectures on "Some Disorders of the Nervous System in Childhood" (1871) and the Harveian oration (1874). About 1878 he became a Roman Catholic. In 1880, he was driven by bad health from the London fogs to Nice, where he practised until 1885. He settled in Harley Street, where many of his old patients came back to him, but he found the doors of the London hospitals closed to him, and after some years of travel and struggle with ill health, he died at Paris on March 19, 1898, at the age of 81. West, a refined, sensitive, pietistic nature, a born orator, a master of simple flawless English, took his profession with priest-like seriousness, was sometimes in hot water with colleagues, had to leave the Children's Hospital and St. Bartholomew's, but was an ideal physician with women and children. Children stopped crying and came to him at once. Through a charming ritual, with marvellous toys, of which the drawers of his office desk were full, he had no difficulty in making the most accurate diagnosis, wrote the most palatable prescriptions and never gave a medicine which he had not previously tasted himself. In spite of the professional hazards incurred by his ideal of the physician's calling—*Benedictus qui venit in nomine Domini*—he practised his specialty in a big human way, rarely equalled and never excelled.*

Fig. 12.—Charles West (1816–98).

The pediatric writings of West include, besides the treatises mentioned, a beautiful lecture to nurses on "How to nurse sick children," first issued anonymously (1852), later under his own name (1855). This is a good example of the classical perfection and simplicity of his style, as also his "Mother's Manual of Children's Diseases" (1885). The pediatric treatise of 1848, passed through seven editions, and was translated into nearly every European language, including Arabic. The German translation of 1865 was edited by Henoch. The sixth edition is based upon nearly 200 clinical cases and 600 post-mortem examinations. The book opens with an admirable lecture on examination of the sick child, and case-taking, after which diseases of the brain and nervous system, respiratory organs, heart, digestive organs, urinary organs and fevers are handled in successive chapters. The classification is *a capite ad calcem*, as in the old Salernitan treatises. The importance of breast feeding in the prevention of infantile diarrhea and tuberculosis is emphasized. The account of infantile tuberculosis, the account of poliomyelitis (Kennedy's or morning paralysis), and the table showing the composition of different kinds of milk with the deduction that asses' milk is chemically

* For the life of West, see Brit. Med. Jour., i (1908), pp. 921–923.

the best for infant feeding are important points in the book, which Jacobi describes as "one of the most instructive and eloquent in medical literature."

American pediatric literature up to 1896 has been carefully analyzed by Samuel S. Adams.*

The outstanding items are the post-mortem sections of cholera infantum by James Stuart (1806), James Jackson (1812), William E. Horner (1829) and J. Lewis Smith (1858), Edward Miller's advocacy of cold bathing in fevers and cold clysters in tormina and tenesmus (1814), the pioneer brief for school hygiene by Edward Reynolds (1833), W. W. Gerhard's papers on smallpox (1832), measles (1833), tuberculous meningitis (1833) and pneumonia (1834) in children, Samuel Jackson's paper on cold water in malignant scarlatina (1833), John Watson's letter on surgical diseases of childhood (1853), Joseph O'Dwyer's device of intubation in diphtheritic croup (1879–86) and the pediatric treatises of "An American Matron" (1810), George Logan (1825, William P. Dewees (1825), which combats swaddling, the abuse of cradle-rocking and the chewing of infant's food by the nurse, John Eberle (1833), who follows Dewees, James Stewart (1843), D. Francis Condie (1847), J. Forsyth Meigs (1848), Charles D. Meigs (1850), J. B. Beck on infant therapeutics (1849) and the later books of Jacobi, Smith, Keating, Starr, Rotch and Holt.

It seems, in an old cant phrase "almost providential" that Meissner should have extended his fine bibliography of pediatrics up to the year 1850, for his arrangement of titles affords a clear view of the different cross-currents affecting the progress of this science at the close of an epoch. Helmholtz's essay on the Conservation of Energy (1847), Virchow's Cellular Pathology (1858) and Darwin's Origin of Species (1859) signalized the advent of a new way of looking at things, the beginnings of the more exact and scientific medicine of the laboratory and the clinic. While this tendency did not affect pediatrics appreciably before the beginning of the twentieth century, it was heralded by the rise of German influences in the works of Bednar, Gerhardt and Henoch, the forerunners of the metabolists. Up to the middle of the century, the trend of pediatrics had been determined by French influences, which were fourfold, viz., the effect of the teachings of Bichat, Cruveilhier, Laënnec, Louis and Chomel upon internal medicine; second, the cult of teaching internal medicine and pediatrics by case histories, inaugurated by Andral and Valleix; third, the example set by Billard in the classification, nomenclature, and delineation of infantile diseases; fourth, the effect of the doctrines of Broussais, which exerted a marked effect upon infantile pathology for nearly half a century. Broussais maintained that disease is merely the effect of local inflammation upon some part of the body, that specific morbid poisons are non-existent, that to label a group of symptoms with a name is merely "ontology," and that most internal disorders are the effect of gastro-enteritis. All medical Paris was for a time polarized by these theories of Broussais, an old army surgeon of Napoleon's campaigns, who had once sworn at troops as a sergeant and swung a privateersman's cutlass in the Revolution. As he approached the scriptural span of life, Broussais grew more and more tyrannical. Laënnec likened him to Paracelsus. The satirical fun-loving Parisians

* S. S. Adams, Tr. Am. Pediat. Soc., N. Y., ix (1897), pp. 5–31.

of the younger set—Louis, Chomel, Trousseau, Velpeau—were fain to see him as Gambetta later envisaged MacMahon: "*Il est resté parce qu'il n'a pas compris qu'il devait s'en aller.*" But through his influence infantile diarrhea, typhoid, and other intestinal disorders were regarded as symptoms of gastro-enteritis. Even after the time of Billard, indeed as late as 1845, P. Hood in his "Practical observations on the diseases most fatal to children," proposes that they be treated as resulting from "irritation" rather than inflammation, which is mere empty phrasing. The attempt at an exact classification of the disorders of infant nutrition is mainly characteristic of Bednar, Gerhardt, Henoch, and the later German school.

Between 1800 and 1850, Meissner lists some 150 separate treatises on pediatrics. Apart from those already named, the books of Friedrich Jahn (1803), which follow the Brunonian theory, Ludwig Formey (1811), J. Capuron (1813), J. Feiler (1814), L A. Gölis (1815), J. M. Combes-Brassard (*L'ami des mères*, 1819), A. Levreton (1820), M. Veron (1821), C. T. Haden (1827), F. A. von Ammon (1827), Miles Marley (1830), F. L. Legendre (1846), James William Coley (1846) deserve mention. From Dublin came the "Observations" of Gustave Hume (1803) and the "Practical Treatise" of Richard T. Evanson and Henry Maunsell (1836), from Italy the "Compendio" of Giuseppe Maruncelli (Naples, 1808).

In the second half of the nineteenth century, the principal writers on pediatrics were mainly German.* After the death of Parrot French pediatry passed into eclipse and, in 1904, Escherich declared its glory had departed from it (Hutinel).

Alois **Bednar,** a docent at the University of Vienna, was, in the words of Jacobi, "one of the most original scientific pediatrists of Europe," an active and enlightened teacher who never attained to the professoriate. He was author of a treatise on the diseases of newborn and suckling infants, in four parts (1850–53), which was translated into Dutch, a pediatric *Lehrbuch* (1856), and a treatise on infant diet (1857). He gave the original description of Bednar's aphthæ, which had been adumbrated by Felix Würtz. His pediatric treatise is distinguished by most careful accounts of the different toxemias of infancy, which were so plentiful in the foundling asylums of his time.

Carl **Hennig** (1825–1911), of Dresden, graduated in 1848, at Leipzig, where he became director, of the Pediatric Polyclinic (1855), and, in 1863, of the Children's Hospital founded by him, and from which he issued reports (1866–82). He published treatises on pediatrics (1855, 3d ed., 1864), gynecology (1893), and obstetrics (1893), and wrote the monographs on the history of pediatrics, cephalhematoma, umbilical diseases, sclerema, diseases of the female sexual organs, and diseases of the thymus gland in the Gerhardt Handbuch (1877–93). His exact and learned pediatric treatise would have been better recognized had he attained more worldly prominence (Jacobi).

* In selecting and arranging the pediatric writers of the modern German school, I wish to acknowledge the valuable information kindly furnished me by the late Dr. A. Jacobi, whose advice to younger men was ever generous, encouraging and sympathetic.

Alfred **Vogel** (1829–90), of Munich, and Erlangen graduate (1853), an assistant in Pfeuffer's clinic (1853–55), and later professor and director of the medical clinic at Dorpat (1866–86), was the author of clinical investigations on typhoid fever (1856, 2d ed., 1860), a new test for milk (1862), a monograph on diseases of the lips and mouth (1874), and a text-book of children's diseases (1860), which passed through twelve editions and was translated into English.

Johann Heinrich **Rehn,** a graduate of Marburg (1855), was one of the first to study epidemic jaundice in children (1869), published an atlas of the bony alterations of the chest (1875), described nodular rheumatism as an affection peculiar to the tendon-sheaths (1878), and

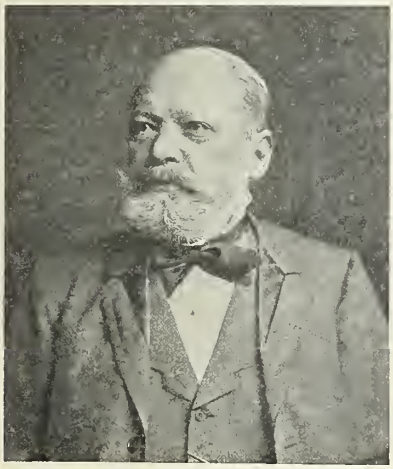

Fig. 13.—Carl Gerhardt (1833–1902).

Fig. 14.—Johann Thoedor August Steffen (1825–1909). (Courtesy of Dr. A. Jacobi, New York.)

contributed the monographs on rickets (1878) and diseases of the peritoneum (1879) to the Gerhardt *Handbuch.*

Carl **Gerhardt** (1833–1902), of Speyer, a pupil of Bamberger and Griesinger, graduated at Wurtzburg (1857), became professor and leader of the Medical Clinic at Jena (1861), and succeeded Bamberger at Wurtzburg (1872) and Frerichs at Berlin (1885). Although one of the greatest pediatrists of modern times, he disliked specialism and eschewed it. To laryngology he contributed his famous monographs on laryngeal croup (1859), paralysis of the vocal cords (1863–72), laryngeal tumors (1896), diseases of the pleura and syphilis of the larynx, and trachea (1898); to diagnosis, his treatise on auscultation and percussion (1866), to pediatrics, his *Lehrbuch* (1861, 5th ed., 1897–9) and the great *Handbuch* of 1877–96, to which the most eminent German pediatrists of his time contributed, and which, with the third edition of Rilliet and Barthez (1884), is the main storehouse of historic data about children's diseases. He also introduced the iron chloride

reaction for acetonemic urine (1865). He was a master of concise expression. "Every sentence," says Jacobi, "expressed a fact, a truth." He died on July 21, 1902, in the same year with Virchow, Kussmaul, and Ziemssen.

Johann Theodor August **Steffen** (1825–1909), of Stettin, a graduate of Halle (1848), was Pfeuffer's assistant at Heidelberg (1847–48) and subsequently physician in chief at the Children's Hospital founded by him at Stettin (1853–1900). From this institution came his *Klinik der Kinderkrankheiten* (1865–89), his essays and observations on certain important children's diseases (1895), and his monographs on the pathological anatomy of childhood (1901) and malignant tumors in children (1905). To the Ziemssen *Handbuch*, he contributed the articles on whooping cough and spasm of the glottis (1876), to the Gerhardt *Handbuch* that on cerebral disease in children (1879). He was also coeditor of the *Jahrbuch für Kinderheilkunde* (1867–1900). In 1898, Steffen proposed a strong diet for infancy, the harmful effects of which were denounced by both Heubner and Czerny (1900).*

Fig. 15.—Eduard Heinrich Henoch (1820–1910). (Courtesy of Dr. George N. Acker, Washington, D. C.)

Eduard Heinrich **Henoch** (1820–1910), of Berlin, a pupil of Schönlein and Romberg (his uncle), graduated at Berlin in 1842, became professor extraordinarius (1858) and was director of the Pediatric Clinic and Polyclinic at the Charité for twenty years (1872–93) after which he retired to Meran and Dresden. He published clinical contributions from Romberg's polyclinic (1846–51), a clinic of abdominal diseases (1852–58), a series of Contributions to Pediatrics (1861–68), lectures on children's diseases (1881, 11th ed., 1903), which was translated into English (Sydenham Society, 1889), twice into Russian (1881, 1888), and French (1885). He translated George Budd's treatise on diseases of the liver (1846) and Charles West on diseases of children (1872) and was the first to describe abdominal purpura (Henoch's purpura, 1874) and dyspeptic asthma (1876). A *Festschrift* (*Pädiatrische Arbeiten*), edited by Adolf Baginsky, was published in honor of his seventieth birthday in 1890. His lectures on pediatrics are written in classic style and are described by Jacobi as "belonging to

* Steffen, Jahrb. f. Kinderheilk., xlvi (1898), p. 332; Heubner, Jacobi Festschrift (1900), p. 290; Czerny, Jahrb. f. Kinderheilk., li (1900), p. 15. Cited by Czerny-Keller.

the most exquisite specimens of literature." Upon his retirement in 1893 his chair was offered to Jacobi, but being declined, was occupied by Heubner and subsequently by Adalbert Czerny.

Otto **Soltmann** (1844–1912) of Berlin, became professor extraordinarius at Breslau (1884), where he was director of the Wilhelm Augusta Hospital (1872) and the Children's Home (1882). Called to Leipzig, he became director of the University Clinic (1894) and built the large Children's Hospital there (1898). He contributed to the Gerhardt Handbuch, published a book on the treatment of diseases of nurslings (1881, 2d ed. 1886) and wrote on infantile neurology (1875–78), gestures of sick children (1887), pavor nocturnus (1888), children's handwriting (1890), physiological peculiarities of childhood (1895), wth *Arbeiten* from his clinic (1896–98).

Fig. 16.—Adolf Baginsky (1843–1918). (Courtesy of Dr. J. H. Hess, Chicago.)

Philipp **Biedert** (1847–1916), graduated at Giessen with a dissertation on the chemical differences between human and cow's milk (1869, 2d ed., 1884), served as a volunteer medical officer in the Franco-Prussian War, became head-physician of the City Hospital at Hagenau (Alsace) and professor (1895). He was one of the original founders of the German Society of Pediatrics (1883), and inaugurated the science of artificial infant feeding. In 1879, he described "fat diarrhea" (Demme, 1874–77). He published a treatise on infant nutrition (1880, 5th ed., 1905), edited the ninth and later editions of the Vogel *Lehrbuch*, and a volume on the care of children called *Das Kind* (1906). Maintaining that cow-casein is far less digestible than casein of human milk, he introduced a series of graduated mixtures of cream, water and milk-sugar (*Rahmgemenge*) as surrogates for cow's milk, from which came the earliest preparation of preserved cream (ramogen). In 1888, Biedert signalized the difficulty of digesting casein as a prominent cause of infantile disorders.

Adolf **Baginsky** (1843–1918), of Ratibor, Silesia, a pupil of Virchow and Traube, graduated at Berlin (1866), served in the Franco-Prussian War, opened a special polyclinic for children's diseases in Berlin (1872) and became professor extraordinarius in the University (1891). In 1890, in collaboration with Virchow, he founded the Kaiser-und Kaiserin-Friedrich Kinderkrankenhaus, of which he was director. His pediatric writings include a Handbook of School-Hygiene (1876,

3d ed., 1898–1900), a series of "Practical Contributions to Pediatrics" (1881–84), a text-book of children's diseases (1882, 7th ed., 1902), monographs on diphtheria (1893–5), a treatise on infant hygiene and infant nutrition (with Paul Sommerfeld, 1906), and a large number of separate essays and popular writings. He was one of the most active and practical scientific pediatrists of modern times. In 1877, he founded, with Alois Monti, the *Central-Zeitung für Kinderheilkunde* (1877–9), which in 1880 became the *Archiv für Kinderheilkunde*, of which he was co-editor up to 1918, the volume for 1913 being a *Festschrift* in his honor. He also edited a series of *Arbeiten* from the Friedrich Children's Hospital (1891–97).

Of the Austro-Hungarian pediatrists, Ludwig **Mauthner von Mauthstein** (1806–58), of Raab, graduated at Vienna (1831) and became an army surgeon. Renouncing his military career in 1837, he took up pediatrics in Vienna. He founded an Institute for the treatment of poor sick children, which is the present St. Ann Hospital. Here Mayr, Widerhofer and Escherich made themselves famous as teachers. In 1844, Mauthner opened the first pediatric clinic. In 1850, he acquired a Children's Hospital and a professorial position. He was ennobled in 1849. He published reports from St. Ann (1851), treatises on diseases of the brain and spinal cord in children (1854) and on diet in children (1853).

Johann **Steiner** (1832–76), a graduate of Prague (1858), where he became professor extraordinarius (1866), was the author of many contributions to clinical pediatrics, and of a compendium (1872), which was translated into English by Lawson Tait (1874) and into French (1880).

The founder of the brilliant Vienna school, with its elaborated semeiotics, was Franz **Mayr** (1814–63), of Uderns, Tyrol, a Vienna graduate of 1845, who rose from bitter poverty, to be director of St. Ann and professor of pediatrics in the University. He made extended clinical studies of 594 cases of measles (1852) and congenital syphilis (with Widerhofer and others, 1862), wrote a manual on care of children (1840) and was first editor of the *Jahrbuch für Kinderheilkunde* (1857–63).

Hermann **Widerhofer** (1832–1901) graduated at Vienna, where he became professor in 1885. He wrote a monograph on diseases of the umbilicus in the newborn (1863), the articles on diseases of the bronchial glands, stomach and intestines in the Gerhardt *Handbuch* (1878–80) and was co-editor of the *Jahrbuch für Kinderheilkunde* (1863–1901). From Widerhofer and his pupils came the close delineations of the disorders of infantile nutrition, which Heubner praises. Widerhofer's classification of gastro-intestinal diseases is however, characterized by an extraordinary minuteness.

Gottfried **Ritter von Rittershain** (1820–83), of Lemberg, graduated at Prague (1844), where he was for twenty years courtroom and prison physician, became head physician to the Foundling Asylum (1865), and professor extraordinarius of pediatrics (1865–80). In 1874, he erected

a special pediatric clinic attached to the Foundling Asylum. He wrote on the pathology and therapy of rickets (1863), temporary hemophilia in the newborn (1871), mental activity (*Geistesleben*, 1871), exfoliative dermatitis in infants (1878), the hygiene of childhood (1878), and during 1865–78, issued his clinical and statistical reports from the Foundling Hospital at Prague, which are famous for their wealth of interesting pediatric material. To the history of medicine he made a

Fig. 17.—Gottfried Ritter von Rittershain (1820–1883). (Courtesy of Dr A. Jacobi, New York.)

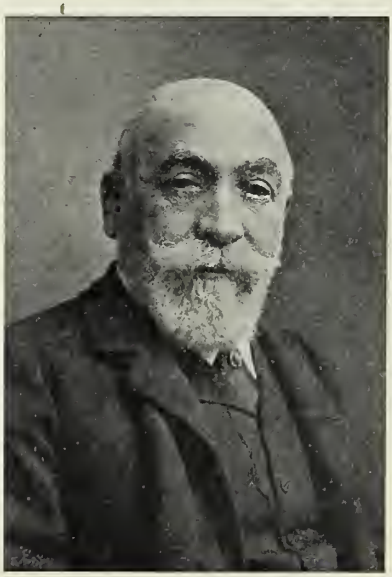

Fig. 18.—Max Kassowitz (1842–1913). (Courtesy of Dr. J. H. Hess, Chicago.)

memorable contribution on the ancient temple-cult of incubation (1878). He founded the *Jahrbuch für Physiologie und Pathologie des ersten Kindesalters* (1868) and was co-editor of its successor, the *Oesterreichisches Jahrbuch für Pädiatrik* (1870–78). Suffering from epilepsy (the subject of his graduating thesis), he retired to Görlitz in 1880, and died of an apoplectic stroke on August 20, 1883.

Alois **Epstein** (1849–1918), of Kamenitz, Bohemia, graduated at Prague (1873), where he became professor and director of the Pediatric Clinic in the University (1884). He wrote on jaundice in the newborn (1880), foundling asylums (1880), duration of gastric digestion in infancy (1880–87), antiseptic measures in infant hygiene (1888), cholera infantum (1890) and disorders of infant nutrition (1899). By rigid asepsis in infant hygiene, Epstein, in fourteen years reduced the mortality in the Foundling Asylum at Prague from 30 to 5 per cent. (Heubner).

Max **Kassowitz** (1842–1913), of Pressburg, Hungary, a Vienna graduate of 1863, assisted and succeeded L. Politzer as director of the Vienna Polyclinic Institute No. I (1881) and became professor of

pediatrics in the University (1891). He wrote on hereditary syphilis (1876), rickets (1881–86), lectures on children's diseases during dentition (1892), a treatise on general biology (1899) and edited a series of pediatric contributions ("Beiträge") from his Institute (1891–93). Kassowitz was the first to recommend phosphorus and cod-liver oil (*Phosphorleberthran*) in the treatment of rickets (1883), but his pathological theory of the disease has been abandoned.

Alois **Monti** (1839–1909), of Abbiategrasso, Lombardy, graduated at Vienna (1862), became Widerhofer's assistant (1862–69), and eventually professor extraordinarius at the University. He wrote the articles on epidemic cholera, diseases of the kidneys and suprarenal bodies, and hemorrhage of the spinal cord in the Gerhardt *Handbuch* (1878–84), and monographs on croup and diphtheria in children (1884), nutrition up to weaning (1897), disorders of infantile nutrition (1897–98), visceral diseases in children (1898–1903) and a series of clinical lectures on pediatrics (1897–1903). With Adolf Baginsky, he was founder and co-editor of the *Central-Zeitung für Kinderheilkunde* (1877–79) and its successor, the *Archiv für Kinderheilkunde* (1880–1909).

Ludwig **Unger** (1848–) of Marienthal, Hungary, a Vienna graduate of 1870 wrote on cortical epilepsy (1886) and diffuse insular sclerosis (1887), in children, published a text-book of pediatrics (1890, 3d ed. 1901), and translated the *Regiment* of Metlinger (1904).

Janos **Bokai** (1822–84), of Igló, Hungary, graduated at Budapest (1847), where he became chief physician to the Hospital for Poor Children (1849) and professor of pediatrics in the University. He was instrumental in the erection of a fine children's hospital of modern type at Budapest (1884). He wrote the monographs on diseases of the male organs, bladder and rectum in the Gerhardt *Handbuch* (1878), and was co-editor of the *Jahrbuch für Kinderheilkunde* (1858–84).

In Russia, Karl **Rauchfuss** (1835–1915), of Petrograd, physician and prosector to the Foundling Asylum (1858–68), director and head-physician of the Children's Hospital (Prince Peter of Oldenburg) in Petrograd (1869) the construction of which was superintended by him (1867–69), also built the St. Vladimir Children's Hospital in Moscow (1874–76) and became pediatrist to the Czar in 1876. He wrote the articles on children's hospitals, diseases of the larynx, congenital abnormalities and fetal diseases of the heart in the Gerhardt *Handbuch* (1877–82), and a number of papers on thrombosis of the pulmonary artery in infancy (1859), congenital stenosis of the aorta (1860), joint inflammation in infancy (1863), croup (1885), etc. All these papers are valuable for new data, and the historical study of children's hospitals (1877) is perhaps the best ever written. Rauchfuss practiced the most rigorous isolation of contagious cases in his wards, and was highly esteemed, both as specialist and scientific surgeon, in the Russian capital.

Nil Féodorovich **Filatoff*** (1847–1902), a native of the Penza Govern-

* The name is usually spelled, according to German transliteration, "Filatow." The accent is thrown upon the second syllable.

ment, graduated at Moscow (1869) and after a course of study at Vienna and Prague, under Widerhofer, Monti, and Steiner, became privat-docent in pediatrics in the Moscow Faculty (1876) and professor in 1891. At the same time, he became director of the new Chludoff Children's Hospital, which, through his engaging lectures, he made one of the finest pediatric clinics in the world. He wrote a series of lectures on infectious diseases in children (1885–87), a highly esteemed treatise on the semeiology and diagnosis of children's diseases (1890)—both frequently translated—and a number of shorter pediatric textbooks and lecture-courses on pediatrics. In his lectures on infectious diseases (1887, II, 113), he first described as "scarlatinal rubella" the anomalous exanthem which Dukes, in 1900, described as the **"fourth disease"** (Filatoff-Dukes disease). He was the first president of the Moscow Pediatric Society (1892) and was annually reëlected until his death. In spite of his occasional brusquerie, he was universally beloved for his large, unselfish unprejudiced nature.

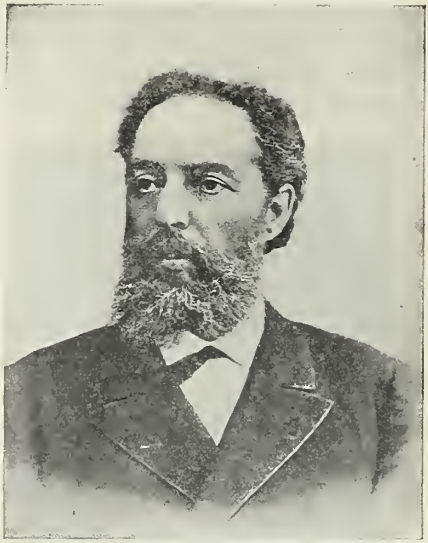

Fig. 19.—Nil Féodorovich Filatoff (1847–1902).

Dmitri Alexandrovich **Sokoloff** (1861–) has published a clinic of pleurisy in children (1906) and a remarkable collection of photographs of sick children (1914). From the laboratory of the Kaiserin Augusta Victoria Haus, Berlin, came important studies by Arvo **Yllpö**, of Helsingfors, on icterus neonatorum and congenital obstruction of the bile-ducts (1913).

In France, Armand **Trousseau** (1801–67), of Tours, the eminent clinical lecturer of the Hôtel Dieu, performed the first tracheotomy in Paris (1831), eventually averaging 25 per cent. of recoveries in 200 cases, introduced the well-known diagnostic sign in infantile tetany, described laryngeal phthisis, gastric vertigo, the cutaneous and mucous diphtherias, recreated French therapeutics and originated thoracentesis in pleurisy (1843). It is said that Trousseau put choleriform enteritis on the pediatric map. His famous *Clinique médicale de l'Hôtel Dieu* (1861) did much for the specialty of children's diseases. The lectures on scarlatina, measles, rubella, mumps, diphtheria, aphthæ, laryngismus stridulus, infantile convulsions, tetany, whooping cough, incontinence of urine, cholera infantum, lactation and dentition, syphilis in the newborn and rickets make up what is virtually a substantial pediatric treatise within the great work itself. This was the last time that important pediatric contributions were published as a subsidiary

portion of internal medicine, yet never, perhaps, under more brilliant auspices.

Marie-Jules **Parrot** (1839–83) of Excideuil (Dordogne), a Paris graduate of 1857, succeeded Lorain as professor of medical history in the Paris Faculty (1876), which chair he subsequently exchanged for that of pediatrics. He described syphilitic pseudo-paralysis (Parrot's disease) in the newborn (1872), and its relation to rickets, also different diseases of the brain in infancy (1868–75). In his *Clinique* of 1875, he

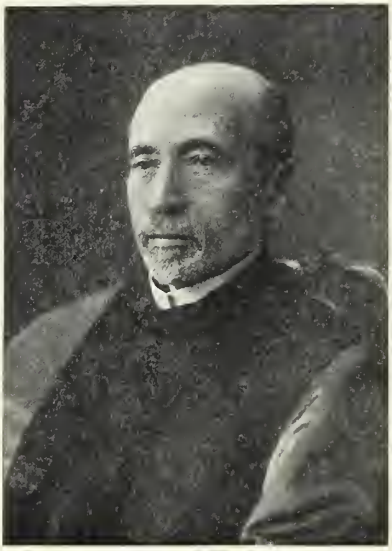

Fig. 20.—Jacques-Joseph Grancher (1843–1907). (Courtesy of Dr. John John S. Fulton, Baltimore, Md.)

Fig. 21.—Victor-Henri Hutinel (1849–).

introduced the concept "athrepsia," a general state of malnutrition, as the deep, underlying cause of most infantile diseases, which has been latterly ridiculed by Hutinel. In 1881, Parrot, Tarnier, Fournier and others attempted infant nutrition (particularly in congenital syphilis) by direct suckling from the udders of the goat, as depicted in the art of antiquity and recommended by Raulin (1769). As shown by Marfan, the merits of the method were "possible but not probable," *i.e.*, it may bring on rickets and has otherwise no special advantage.

Henri-Louis **Roger** (1809–91) of Paris, where he took his medical degree (1839), was physician to the Hôpital Sainte-Eugénie (1860–75), and wrote a treatise on auscultation (with J. B. P. Barth 1850), a treatise on the semeiology of infantile diseases (1864), and a series of *Recherches cliniques* on chorea, rheumatism, heart disease, syphilis and whooping cough in children (1867–83). He described the congenital interventricular communication known as "Roger's disease."

Jacques-Joseph **Grancher** (1843–1907), of Paris, famed for his

graduating dissertation on the unity of phthisis (1872), wrote much on pulmonary tuberculosis (1872–90), a series of papers on isolation and medical antisepsis in the Hôpital des enfants (1889–90),* and collaborated with Comby and Marfan in a massive *Traité des maladies de l'enfance*, in five volumes (1897, 2d ed., 1904–5). At the Hôpital des enfants malades, Grancher introduced surgical asepsis in the children's wards (1889), each infectious case being "boxed" in a quadrangular wire cage, which no one was allowed to enter except in a surgical gown.

Victor-Henri **Hutinel** (1849–), of Chatillon-sur-Seine, graduated at Paris with a dissertation on disturbances of the venous circulation in children (1877), became professor of clinical pediatrics in the Paris Faculty, and succeeded Grancher at the Hôpital des enfants malades. At the Hôpital des enfants assistés, Hutinel replaced the wire screens (*grillages*) of Grancher by transparent glass screens with doors and the usual aseptic ritual of entry and egress (1894).* These isolation cubicles were widely imitated.

He wrote on diseases of the intestines (1907), introduced the excellent Elements of Infantile Semeiology by Fernandes Figueira (1903) and edited the five-volume system of pediatrics entitled *Les Maladies des Enfants* (1909). He is also co-editor of the *Archives de médecine des enfants* (1898–1922).

FIG. 22.—Jules Comby (1853–).

Jules **Comby** (1853–), of Pompadour (Corrèze), a Paris graduate of 1881, and chief physician to the Hôpital des enfants malades, is the author of monographs on zona (1889), rickets (1892), mumps (1893), pulsatile empyema (1895) and diathetic diseases (1901) in children, a pediatric treatise (1892, 5th ed.,1907), a pediatric formulary (1894) and pocket formulary (1901), a treatise on infantile therapeutics (1900) and a series of pediatric consultations (1910). He is editor of *La Médecine Infantile* (1894) and co-editor of the *Archives de médecine des enfants* (1898–1922) and the five-volume *Traité* (1897) mentioned above.

Gaston-Félix-Joseph **Variot** (1855–), of Demiguy (Säone-et Loire), graduated at Paris with a thesis on leucocythemia (1882), became physician to the Hôpital des enfants malades and professor of infantile surgery in the Paris Faculty and is author of treatises on the formed elements of the blood (1886), household pediatrics (1892), diphtheria and serum therapy (1898) and infant hygiene (1908, 1910).

* Grancher, Rev. d'hyg., Paris, xi (1889), p. 204; xii (1890), p. 495.

He translated the Goodhart pediatric treatise (1895) and edited the *Journal de clinique et de thérapeutique infantiles* (1893–94). At his *goutte de lait* at Bellevue, he did much philanthropic work.

Bernard-Jean-Antonin **Marfan** (1858–), of Castelnaudary (Aude), graduated at Paris (1887) and became chief of the clinic in the Hôpital Necker and professeur agrégé (in the Paris Faculty 1892). He is the author of works on infantile eczema (1894), typhoid fever (1894) and peritonitis (1894) in children, congenital infections in the newborn (1897), infant nutrition (1899), infantile gastro-enteritis (1900), diphtheria and diseases of the air-passages (1905), diseases of the respiratory diseases, in the Bouchard system (1892), collaborated with Grancher and Comby in their pediatric system of 1897, and is editor of *Le Nourrisson* (1913–22). In 1900–1902, he demonstrated and investigated, with Charles Gillet, the oxidizing and fat-splitting ferments in milk (oxydase and lipase).*

In Great Britian, the obstetrician Fleetwood **Churchill** [1808–78], of Nottingham, England, who graduated M.D. at Edinburgh (1831) and practiced in Dublin, published a large treatise on diseases of children (1850), which was popular and was edited in America by William V. Keating.

Sir James Frederic **Goodhart** [1845–1916], of London, an Aberdeen graduate of 1873, became assistant physician (1877) and physician (1886–98) to Guy's Hospital, where he did much post-mortem work and lectured on pathology to the medical school. He was also pathological assistant to the Museum of the Royal College of Surgeons, prepared the Supplementary Catalogue (1879) and assisted Sir James Paget in preparing the new edition of the whole catalogue (1885). In 1885, he also published his Students' Guide to the Diseases of Children, which reached its tenth edition in 1913 and was translated into French. In the later English editions, Goodhart was assisted by Still, while the American editions were edited by Louis Starr. This book, the work of an expert pathologist and clinician, has been highly esteemed as confining itself to diseases peculiar to children and not attempting to cover the whole of internal medicine.

Henry **Ashby** (1845–1908), of Manchester, a medical graduate of the University of London (1878), was a forerunner of the brilliant group of English public health officers who have done so much, in recent years, for infant welfare. In 1879, he was appointed physician to the Manchester (Pendlebury) Hospital for Sick Children (168 beds), which he served for nearly thirty years. During 1880–1908, he was lecturer on pediatrics to Owens College and the University of Manchester. He did much for popular propagandism in aid of infant welfare and a pure milk supply, gave important evidence before the Interdepartmental Committee on Physical Deterioration (1904), examined the feeble-minded (1900) for the Manchester Schoolboard, and the epileptics (1915) for a Royal Commission, and established the Residential School for 65 epileptic children in Swinton Park. Its

* Marfan and Gillet, Monatsschr. f. Kinderheilk., i (1902–3), pp. 57–63.

success was entirely due to his efforts. He published a useful manual of "Notes on Physiology (1878, 8th ed., 1910), popular lectures on infant feeding (1878–82), Health in the Nursery (1898), and with George Arthur **Wright,** consulting surgeon to the Royal Infirmary Manchester, a treatise on the medical and surgical diseases of children (1889, 5th ed., 1905), which was signalized by Jacobi as the first in which a surgeon and pediatrist collaborated to produce a work of unusual merit.

Sir Thomas **Barlow** (1845–), consulting physician to the Hospital for Sick Children, London, and president of the Royal College of Physicians (1910–15), wrote the classical paper on **infantile scurvy**

Fig. 23.—Henry Ashby (1845–1908).

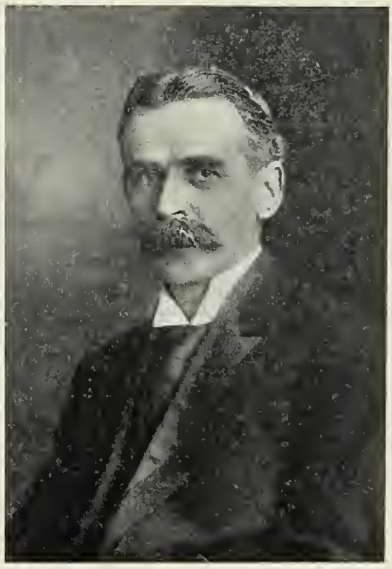

Fig. 24.—George Frederic Still (1868–)

or "Barlow's disease" (1882),* a condition which had already been vaguely outlined, in connection with infantile rickets, by Glisson (1650) and J. O. L. Möller (1856–60). Barlow has also written on pleurisy (1877) and rheumatism (1883) in childhood, and collaborated with Goodhart and Macnamara in the Collective Investigation Committee's reports on acute rheumatism and inherited syphilis (1882).

George Frederic **Still** (1868–), professor of pediatrics in Kings College, London, and physician to the Great Ormond Street and other children's hospitals, made his mark in internal medicine by his original description of arthritis deformans in children or "Still's disease" (1896).† He wrote the treatise on rickets in Osler's Modern Medicine (1907), edited the Goodhart treatise (1905–10) and Charles West's

* Barlow, Med. Chir. Tr., London, lxvi (1882–3), pp. 159–219.
† Still, Med.-Chir. Tr., London, lxxx (1896–7), pp. 47–59, 3 pl.

tract on nursing (1908) and has published an admirable treatise on the "Common Disorders and Diseases of Childhood" (1909, 2d ed., 1912).

Sir Arthur **Newsholme,** late Medical Officer of the Local Government Board, associate editor of the *Journal of Hygiene,* and author of works of Vital Statistics (1889), the natural history and affinities of rheumatic fever (1895), epidemic diphtheria (1898), the causes of the reduction in death rate of phthisis (1906) has rendered signal

FIG. 25.—Janet Lane-Claypon.

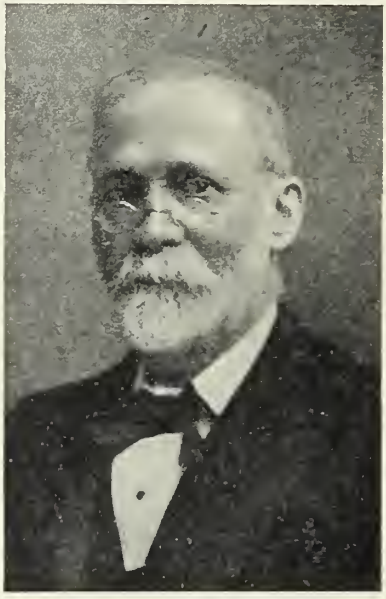

FIG. 26.—Job Lewis Smith (1827–1897).

service to preventive pediatrics through his five reports to the Local Government Board on infant, child and maternal mortality (1910–16), which have established the multiplex causation of infant mortality, its importance as a true index of the adult health of a community and the necessity of manifold devices to combat the evil.

Janet-Elizabeth **Lane-Claypon,** a graduate of the London School of Medicine for Women, and of University College, was assistant Medical Inspector of the Local Government Board (1912–16), and is perhaps the most remarkable living physician of her sex. In 1906, she performed, with Starling, one of the fundamental experiments in endocrine doctrine, showing that section of the nerves supplying the mammary gland does not inhibit lactation, and that after section of the spinal cord in the rabbit, parturition and lactation proceed as ordinarily. Her report to the Lister Institute on the status of child welfare in Europe and her investigations of milk were of basic importance. She is the author of three recent books on Milk and its Hygiene (1916), The Child Welfare and Movement (1920) and The Hygiene of Women and Children.

John **Thomson,** of Edinburgh, translated Henoch's *Vorlesungen* (1889), wrote the monographs on hemorrhage in the newborn in Allbutt's System of Medicine (1909), a useful Guide to the Clinical Examination and Treatment of Sick Children (1898), which has been translated into Russian (1801); and papers on congenital obliteration of the bile-ducts (1891–92) congenital gastric spasm (1897) and causation on congenital stridulism (1901).

David **Forsyth,** physician to the Evelina Hospital for Sick Children, London, is the author of "Children in Health and Disease," a study of child-life (1909), lectures on medical diseases for nurses (1913), a book on psychoanalysis (1913) and a fascinating history of infant feeding from Elizabethan times (1911).

Leonard **Findlay** of Glasgow (M.D., 1904) is the author of studies on the intestine as a pathway of infection for the tubercle bacillus (1913), and the etiology of rickets (1916). The lectures on Diseases of the Long Bones in Children (1894) by the late Thomas Pickering Pick (1841–1919) deserve especial mention here.

The best known American pediatrist of his time, with the single exception of Jacobi, was Job Lewis **Smith*** (1827–97), of Spafford, New York, who graduated at Yale (1849) and began the study of medicine at Buffalo Medical College (1850) under the preceptorship of Austin Flint, who made him an interne in hospital before he took his medical degree at the College of Physicians and Surgeons, New York (1853). Smith became physician to many hospitals, was clinical professor of pediatrics in Bellevue Hospital Medical College and practised uninterruptedly in New York City for nearly fifty years (1853–97). In 1869, he published his Treatise on the Diseases of Infancy and Childhood, based upon his own clinical experience and pathological findings, which passed through eight editions (1869–96), was translated into Spanish, and is still esteemed as a solid, reliable work. During 1854–96, he made some 160 contributions to medical periodicals and systems. He was a man of modest nature, and gentle, unworldly demeanor, a friend of the unfortunate, giving up a large part of his time to the poor, frequently without compensation. He took up pediatrics only after a broad experience in general practice, and once resented a slurring imputation with the warm retort "Yes, perhaps a specialist, but I trust something more." The countenance of J. Lewis Smith, the typical family doctor of the past, is expressive of a generation, less metallic, less conceited, more gentle, modest, and considerate of others, than our own. These old-fashioned American faces we shall not see again.

In the year 1853, there came to New York one who was destined to exert a profounder influence upon American pediatrics than any other physician of the present or past. This was Abraham **Jacobi** (1830–1919,) of Hartum, Westphalia, who graduated in medicine, with a Latin dis-

* For the life of J. Lewis Smith, see the Memorial Notices by Ellsworth Eliot, Tr. New York Acad. Med. (1896–1901), pp. 220–231, and John Strady, Tr. New York State Med. Assoc., N. Y., xiv (1897), pp. 524–538 (with bibliography).

sertation at Bonn (1851) and during the next two years was held in detention in German fortresses at Cologne and Minden for revolutionary activities and "lèse majesté." Escaping to England, he eventually reached Boston and commenced practice at 20 Howard Street, New York. One year after, he invented a mirror laryngoscope of his own, which, unfortunately, he did not either patent or make public before the announcement of Manuel Garcia's invention (1855); but by 1857, he was lecturing on pediatrics in the College of Physicians and Surgeons of New York, and thus, as Adams says, "pressed the button which set the pediatric clinic in motion." Three years later, he was appointed to the first special chair of diseases of children in the New York Medical College (1860–64). In 1865, he accepted the same "clinical" chair in the Medical Department of the University of New York, and in 1870, he became clinical professor of pediatrics in the Medical Department of Columbia College (1870–99). All in all, he taught pediatrics in New York for nearly half a century (1857–99). With the exception of J. Lewis Smith, he was the only American practitioner who cultivated pediatrics at this time. With the foundation of the new pediatric chair in 1860, the faculty of New York Medical College established a pediatric clinic, with extensive bedside instruction (1862–64). Thus bedside teaching in this country was first associated with pediatric teaching,* even before internal medicine. In 1858, Jacobi published his first paper on colonic intussusception in infancy, which was followed by a paper on infantile rickets (on premature closure of the fontanelles and cranial sutures) and a volume of "Contributions to Midwifery and Diseases of Women and Children" (1859) by Jacobi and Emil Noeggerath. This was followed by his initial course of lectures on Diseases of the Larynx (1859). He wrote much on diphtheria during 1860–80, and published, in succession, books on Dentition and its

Fig. 27.—Abraham Jacobi (1830–1919).

* "If ever you will recall for yourself and your friends the first, the very first beginning of medical bedside instruction in America, please tell them of the small college on East 13th Street—I believe 118—which had to close its doors in 1864, a victim of the Civil War, which deprived us of all of our Southern students. That is part of your American medical history worth remembering. I was permitted to be quite active in this successful enterprise, and utilized my opportunities in preferring my pets, the young patients. My later experience will teach you that successive bedside teaching was almost exclusively pediatric. Thus pediatry was the example of giving correct medical instruction. Jacobi, Arch. Pediat., New York, xxxiv (1917), p. 10.

Derangements (1862), Infant Diet (1872, 1874,* 1878), Diphtheria† (1876, 3d ed., 1903), the Intestinal Diseases of Infancy and Childhood (1887), Diseases of the Thymus Gland (1889), Therapeutics of Infancy and Childhood (1896, 2d ed., 1903) and a series of clinical lectures (stenographed, 1893). With Emil Noeggerath, he was the founder and editor of the *American Journal of Obstetrics* (1868–71). To the Gerhardt *Handbuch*, he contributed monographs on the care and hygiene of children (1876, 2d ed., 1882), diphtheria (1877), and dysentery (1877). The first of these, written with force, fire and a vast amount of fine sarcasm, is of unusual historical and practical value, by reason of its accurate bibliographies (four years before the appearance of the Index Catalogue), its lively arraignment of the various artificial foods, its wholesale denunciation of existing shams and abuses, and its rare common sense. The treatise on infantile therapeutics (1896) is, in effect, a treatise on pediatrics, summarizing the author's views and revealing his wide knowledge of the literature. Jacobi's teaching in regard to infant nutrition is simple: mother's milk first and foremost, raw unpasteurized cow's milk never, but corrected by cereal decoctions and salt; the use of cane sugar in place of milk sugar, which is different in human and cow's milk and frequently adulterated. A high percentage of fat is adjudged harmful, and a monotonous diet is especially to be avoided, as leading to scurvy, rickets and other deficiency diseases. One by one, the practical bedside physician and the laboratory specialist alike have come around to the substance of these views.

During sixty years of active practice, Jacobi had written a vast number of clinical papers, essays and public discourses, which are remarkable for the subtle wisdom of long experience, wide learning which is never obtruded, and delicate humor. These have been published as Collectanea Jacobi in eight volumes (1909),‡ five of which are devoted to pediatrics. Among the more important papers are those on laryngeal catarrh (1859) and laryngismus stridulus (1869), craniotabes (1871), masturbation and hysteria in infants (1875), rickets (1885), acute catarrhal and pseudo-membranous laryngitis (1885), stomatitis neurotica chronica (1894), the muscles of rachitic infants (1894), nephritis of the newborn (1896), milk sugar in infant feeding (1901) and the memorable discourse "Non nocere" (1894). To the history of pediatrics, Jacobi has contributed several important papers, notably his history of American pediatrics before 1800 (1902), his St. Louis address (1904), pediatrics in the United States (*Baginsky-Festschrift*, 1913), the history of cerebrospinal meningitis in America (1905) and the history of pediatrics in New York, City (1917); to the history of medicine, his memorial notices of Ernst Krackowizer (1875), Virchow (1881–1901), Austin Flint (1886), Carl Gerhardt (1902), valuable histories of nursing (1883), therapeutics (1905), medical libraries (1906), American medicine (1900), German medical teaching (1901) and his letters on the condition of American medicine (1909).

The later writings of Jacobi are characterized by a vein of irony of the most delicate and elusive type. There is often a quaint surprise in every sentence. The mirthful goddess, *quam Jocus circumvolat*, is seldom absent from his pages, and this omnipresent sense of humor has

* Revised, enlarged and adapted to popular use by Mary Putnam Jacobi.
† Translated into Italian by Vincenzo Meyer, Naples (1884).
‡ Edited by William J. Robinson, New York (1909).

endeared him particularly to Americans. A banquet, with presentation of a loving-cup and the publication of a *Festschrift*, was held, in honor of his seventieth birthday, on May 6, 1900. As our first teacher and professor of pediatrics, as the founder of bedside instruction in this country, as the founder of the pediatric sections of the American Medical Association and the New York Academy of Medicine, as the first president of the American Pediatric Society, he became through years of dignified labor and distinguished honor, the leader and the Nestor of his profession in the United States. He could have had Henoch's chair when Henoch died, but declined it to remain, in his own phrase, "a bridge between European and American pediatrics." A valued friend of Billings, it was Jacobi who secured the Congressional appropriations for printing the Index Catalogue. In advanced age, he remained ever true to the ideals of his fiery youth. Not a line in his writings that does not reveal the man who values the truth above all things, who cares more for the truth than for himself; not a public utterance but is informed with the highest type of civic and moral courage. And it was under the guidance of a man of this inherent *noblesse* of mind and character that American pediatrics has prospered to its present fair estate.

Intubation of the larynx became a permanent rational procedure in pediatrics through the labors of Joseph **O'Dwyer** (1841–98), of Cleveland, Ohio, who came to New York in 1864, graduated in medicine at the College of Physicians and Surgeons (1866), served as interne in the Charity Hospital, began practice in 1868, became connected with the New York Foundling Asylum (1873), the Willard Parker, St. Vincent's and the Foundling Hospitals, and was president of the American Pediatric Society (1880). In 1880, he began to think about the possibilities of intubation, which had been neglected after the rebuffs encountered by Bouchut's idea of *tubage* (1858). In 1885, he began publishing reports of intubation in croup and chronic laryngeal stenosis, and by 1887, his claims, based upon records of hundreds of well authenticated cases, were recognized by the Medical Society of New York (State) and the New York Academy of Medicine (Jacobi presiding). Prior to this time, tracheotomy had been the procedure in laryngeal obstruction, in the practice of Ernst Krackowizer, Jacobi, Roth, Voss and others. During 1860–87, Jacobi performed tracheotomy over 700 times and assisted in more than 2000 cases. "After 1887," he says, "I rarely, ever operated, and my friends stopped tracheotomy when O'Dwyer taught us all intubation."* O'Dwyer's work was taken up with enthusiasm by Hutinel (Paris), Bokai (Budapest), Concetti (Rome) and Rauchfuss (Petrograd). He himself taught intubation with success in the New York schools. His obstetric practice was large, covering over 3000 confinements, but the death of his wife and other worries connected with over-work, insomnia from night-

* Jacobi, Arch. Pediat., New York, xxxiv (1917), pp. 5–6. For a full history of O'Dwyer's work, see W. P. Northrup, Med. Rec., New York, lxv (1904), pp. 561–564.

calls, and captious criticisms of his invention, finally broke down his health, and he died from thrombosis of the cerebellar arteries with secondary meningitis on January 7, 1898. His temperament was of the retiring, diffident kind which endures great internal suffering from senseless criticism and blundering opposition. "Whenever the records of diphtheria will be written up," says Jacobi, "there will be four names at the head of those who deserve the places of honor, Bretonneau, Trousseau, Behring and O'Dwyer."*

Another pioneer in pediatrics as a specialty, detached from internal

FIG. 28.—Joseph P. O'Dwyer (1841–1898).

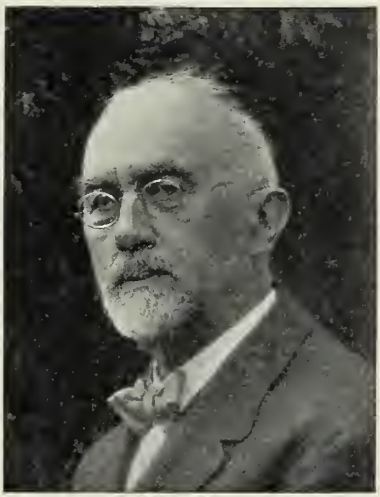

FIG. 29.—William Perry Northrup (1851–).

medicine, is William Perry **Northrup** (1851–), of Peterboro, N. Y., who graduated M.D. at the College of Physicians and Surgeons, New York, 1878, and became professor of pediatrics in University and Bellevue Hospital Medical College (1896). He performed the largest number of infantile autopsies in his period. He edited the American edition of Ashby and Wright (1893) and has written on emphysema and pulmonary abscess after whooping cough (1883), pneumonia (1889–97), sclerema (1890), infantile scurvy (1890–95) and on the open air treatment of pneumonia by means of roof wards and roof gardens over private houses, of which he has been a prominent advocate.

Samuel Shugert **Adams** (1853–), of Washington, D. C., graduated in medicine at the University of Georgetown (1879), where he has been a professor of medicine and pediatrics since 1898. He has been a prominent pioneer in his specialty and is the leading pediatrician in the national capital. He has written on strabismus convergens after diphtheria (1884), sudden death in diphtheria (1884), dentition (1889), typhoid in infancy (1895), temporary insanity following typhoid

* Jacobi, Pediatrics, New York & London, v (1898), p. 96, 147.

(1896), and other subjects. His presidential address before the American Pediatric Society (1897), of which he was secretary for 25 years (1891–1916), is a breezy and discriminating review of American pediatric literature between 1789 and 1897, a most valuable and readable historical summary.

John M. **Keating** (1852–93), of Philadelphia, a graduate of the University of Pennsylvania (1873), and practitioner of pediatrics and gynecology, was the author of "A Mother's Guide" (1881), Diseases of the Heart and Circulation in Infancy and Adolescence (with W. A.

Fig. 30.—Samuel Shugert Adams (1853–).

Fig. 31.—Louis Starr (1849–).

Edwards, 1888), Mother and Child (with E. P. Davis, 1893), and in 1890–91 published a Cyclopedia of the Diseases of Children by many authors, which was the earliest coöperative American work of the kind, and did much to stimulate interest in this specialty.

Louis **Starr** (1849–), of Philadelphia, a graduate of the University of Pennsylvania (1871), where he became clinical professor of pediatrics (1884–90), is the author of works on the digestive disorders, of infancy and childhood (1886, 3d ed., 1901), the Hygiene of the Nursery (1888, 8th ed., 1913), Diets for Infants and Children (1896), edited the American editions of Goodhart's treatise (1885, 1889), and in 1895, edited an American Text-book of the Diseases of Children by various authors (2d ed., 1899). He has also edited the department of diseases of children in the American Year-book of Medicine and Surgery.

John Price **Crozer Griffith** (1856–), of Philadelphia, a graduate of the University of Pennsylvania (1881) where he has been clinical professor (1891) and professor (1913) of pediatrics, is the author of The Care of the Baby (1895, 6th ed., 1915), a treatise on Diseases of Infants and Children (2 v., 1919) and a large number of contributions on clinical pediatrics.

Benjamin Knox **Rachford** (1857–), of Alexandria, Kentucky, a graduate of the Medical College of Ohio, Cincinnati (1882), where he is now professor of pediatrics (1901), is the author of a treatise on the Neurotic Disorders of Childhood (1905), a treatise on Diseases of Children (1912) and a number of minor contributions.

Henry **Koplik** (1858–), of New York, a graduate of the College of Physicians and Surgeons (1881), and attending pediatrist to Mount Sinai and other hospitals, discovered the spots diagnostic of measles

FIG. 32.—Benjamin Knox Rachford (1857–).

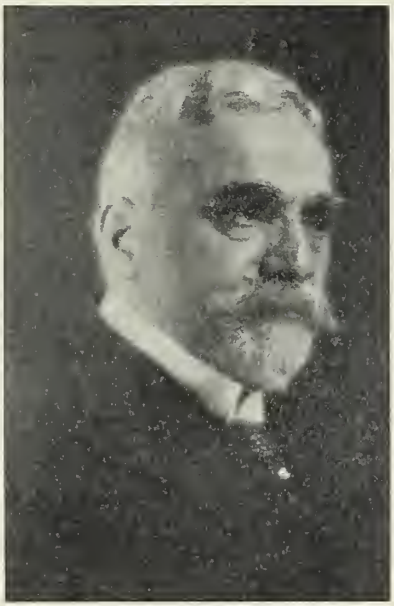

FIG. 33.—Henry Koplik.

(1898), established the first milk depot in the United States and is the author of a treatise on the Diseases of Infancy and Childhood (1902, 3d ed., 1912) and numerous clinical papers.

Bernard **Sachs** (1858–), of Baltimore, Md., a graduate of Harvard (1878) and Strassburg (1882), neurologist to Bellevue and Mount Sinai Hospitals, described amaurotic family idiocy (1887–96), the ocular appearances of which had been noted by Warren Tay in 1880 (Tay-Sachs disease) and is the author of the first American treatise on the nervous diseases of children (1895).

Rowland Godfrey **Freeman** (1859–), of New York, a graduate of the College of Physicians and Surgeons (1886) and professor of pediatrics in the University and Bellevue Hospital Medical School, has written much on the sterilization of milk (1892–96) and clinical subjects, and a pediatric treatise (1917).

Charles Gilmore **Kerley** (1863–), of Red Hook, N. Y., a graduate of University Medical College of New York (1888), lecturer on Diseases of Children (1897–1903) and professor (1903) at the New

York Polyclinic Medical School, is the author of Short Talks with Young Mothers (1902), a practical and helpful book on the Treatment of Diseases of Children (1907) and a Practice of Pediatrics (1914).

Linnæus Edford **LaFetra** (1868–) of New York, associate in pediatrics in Columbia University and chief of the pediatric department of Bellevue Hospital assisted Henry L. K. **Shaw** (1873–) in editing the sumptuous translation of Pfaundler and Schlossmann's Diseases of Children (1908, 1912), and has made numerous contributions to clinical pediatrics.

Hermann Bernard **Sheffield** (1871–), of New York, is the author of a pediatric treatise (1911), 3d ed., 1916), the Baby's Record of Health (1913), the Backward Baby (1915) and translated E. Graetzer's Practical Pediatrics (1905). Other American text books have been written by John Madison Taylor (1855–) and William H. Wells, of Philadelphia (1898, Italian translation, 1903) and Charles Hunter Dunn (1875–), of Boston (1917).

Fig. 34.—Linnæus Edford La Fetra (1868–).

In Canada, Alexander **Blackader** (1847–), professor of pharmacology, therapeutics and pediatrics in McGill University, Montreal, has made several contributions to clinical pediatrics.

Apart from the pediatric treatises already recorded, we may mention those of Eustache Smith (1868), E. Ellis (1869), C. H. Goodwin (1883), Angel Money (1884), James Carmichael (1892) and George M. Tuttle (1899) in England; Jules Beclard (1852), Joachim Giraldés (1869), D'Espine and Pacot (1877), C. L. Cadet de Gassicourt (1880–84) and Pierre Nobécourt (1907) in France; G. A. Braun (1862), A. Stössel (1875), A. von Hüttenbrenner (1876), E. Graetzer (1891) in Germany; Andrea Pasquali (1873–6), and E. Copasso (1892) in Italy; Francisco Criado y Aguilar (1884) in Spain; I. V. Troitzy (1892–3) in Russia; and S. Miwa (1915) in Japan.

Of **original descriptions of disease,** may be mentioned those of bronchitis by Charles Badham (1808) appendicitis by James Parkinson (1812) and Louyer-Villermay (1824), laryngismus stridulus by John Clarke (1815), achondroplasia by M. H. Romberg (1817), hay fever by John Bostock (1819), asthma thymicum and thymus death by Kopp (1830), A. Friedleben (1858) and A. Paltauf (1889), osteopsathyrosis by J. Lobstein (1833), exophthalmic goitre by C. A. Basedow (1840), pituitary obesity by B. Mohr (1840), acute fatty degeneration in the newborn by Ludwig von Buhl (1861–64), adenoid vegetations by Hans Wilhelm Meyer (1868), syphilitic pseudo-paralysis of infants by M. J. Parrot (1872), infantile purpura by E. Henoch (1872), "fat-diarrhea" by Demme (1874–77) and Biedert (1879), mastoiditis by F. Bezold (1877), cyanotic hemoglobinuric jaundice by Franz von Winckel (1879), splenic anemia by G. Banti (1882), infantile scurvy by Sir Thomas Barlow (1882), periodic vomiting by Samuel Gee (1882) and Ernst von Leyden (1882), megacolon by H. Hirschsprung (1887), pseudo-rachitic osteoporosis by S. Miwa and Stoeltzner (1898), fourth disease by N. F. Filatoff (1887) and C. Dukes (1900).

Of the many **diagnostic and therapeutic devices** now employed in pediatrics,

it is only necessary to mention Laennec's stethoscope (1819), thoracentesis, perfected by Trousseau (1843), H. I. Bowditch (1852), Dieulafoy (1869–72) and Estländer (1879), ether anesthesia (1846–47), Helmholtz's ophthalmoscope (1851), Manuel Garcia's laryngoscope (1855), the methods of treating asphyxia neonatorum of H. A. Pagenstecher (insufflation, 1856) and B. S. Schultze (swinging, 1871), the hypodermic syringe of C. G. Pravaz (1851–53), the developments in surgery of the mastoid and middle ear by Schwartze and Eysel (1873), Zaufal (1884), Küster (1889) and Stacke (1890–97), Koch's tubercle bacillus (1881) and tuberculin (1890), Ehrlich's diazo-reaction for acetone (1882), diphtheria antitoxin (Roux and von Behring 1890–93), the Röntgen rays (1893), H. Quincke's lumbar puncture (1895) and Gaertner's tonometer (1899).

Of treatises on **nervous diseases in children,** perhaps the earliest was L. W. Mauthner's Diseases of the Brain and the Spinal Cord (1844). A number of monographs on special subjects preceded and followed this, but apart from the Lumelian lectures of Charles West (1871), perhaps the earliest systematic treatises of importance were those of C. Pavone (Milan, 1892), B. Sachs (1895), B. K. Rachford (1905), M. Thiemich and J. Zappert (1910) and G. Peritz (1912).

Of **original descriptions of nervous diseases,** those of cerebro-spinal meningitis by Gaspard Vieusseux (1805), tetany by John Clarke (1815), S. L. Steinheim (1830), and J. B. K. Dance (1832), softening of the brain by Rostan (1820), poliomyelitis by M. Underwood (1786), John Badham (1835), Jacob Heine (1840) and Duchenne of Boulogne (1865), with the subsequent work of O. Medin (1890), Simon Flexner (1910–16), Peabody, Draper, Dochez and the report of the Swedish Medical Institute (1912), the various forms of progressive muscular atrophy by Duchenne and Aran (1847–68), Charcot and Joffry (1869), Charcot and Marie (1886), Erb (1884–91), Guido Werdnig (1890–94) and Johann Hoffmann (1894), congenital spastic paraplegia by William John Little (1861), hereditary ataxia by Nikolaus Friedreich (1863–76), amaurotic family idiocy by Bernard Sachs (1887), hereditary cerebellar ataxia by Pierre Marie (1893), progressive interstitial hypertrophic neuritis by Jules Déjerine and Jules Sottas (1893) called erythema infectiosum by Salomon Stricker (1899) and amyotonia congenita by Hermann Oppenheim (1900) may be noted.

Among the many writings on **infantile psychology** are a history of the development of the infant mind and morale up to the fourth month by R. B. (*Jour. Nat. Philos.*, 1806), the investigations of J. E. Löbisch (1851), and Adolf Kussmaul on the psychic life of the newborn child (1859), Ritter von Rittershain's *Geistesleben* (1871), Charles Darwin's Biography of an Infant (1877), Wilhelm Preyer's *Die Seele des Kindes* (1882, 8th ed., 1912), the books of J. W. Ballantyne (1890), Millicent W. Shinn (1893–1907), Biography of a Baby (1900), J. Mark Baldwin (1896), Kathleen C. Moore (1896), Maurice de Fleury (1899), Clifford G. Grulee (1915), Karl Groos on games (1899) and the psychic life of the child (1903), Albert Moll on the sexual life of the child (1899), the essays of Sigmund Freud on the same theme, and the studies of G. Stanley Hall (1880–1914).

The earlier writers on the education of children were Oribasius, Erasmus (1516, 1529) and John Locke.

Other works relating to the subject of **child-study** are the anthropometric investigations of H. P. Bowditch (1879–91), W. T. Porter (1892–3), Francis Warner (1888–1917), Arthur MacDonald (1899), Franz Boas and others, H. Ploss's *Das Kind* (1877), Timothy Dwight's *Frozen Sections of a Child* (1881), C. H. Stratz's album "*Die Körper das Kindes*" (1903), the books of A. F. Chamberlain (1896, 1900) W. M. Feldman on the Jewish Child (1917) and on ante-natal and post-natal child physiology (1920), Oscar Chrisman's The Historical Child (1920) and the literature of pedagogics.

Of treatises on **infantile surgery** and the surgical diseases of childhood, aside from two small publications on surgical diseases of the newborn by C. J. Oehme (1773) and F. Zehler (1830), the earliest of importance was that of John Cooper Forster (1860) of Guy's Hospital, which was followed by those of P. Guersant (1864–7), Timothy Holmes (1868), Joachim Giraldès (1869), Cesare Fumagalli (1875), L. A. de Saint-Germain (1884), Edmund Owen (1885), José Ribeira y

Sans (1887), Ferdinand Karewski (1894), D'Arcy Power (1895), Piechaud and Denuce (1900), Sebastian Recasens y Girol (1901), Auguste Broca (1902. 1911, 1914), Samuel W. Kelley (1909), D. G. Gorokoff (1910), William F. Campbell and L. Kerr (1912) and Louis Ombrédanne (1912). The work of Harvey Cushing (1905) and others on intracranial surgery in the newborn deserves mention here.

The history of **infantile orthopedics** is co-existent with the history of orthopedics itself. The earlier landmarks are the treatise περὶ ἄρθρον of Hippocrates, the use of *redressement forcé* (Calot, 1896) by Hippocrates and Avicenna, the Children's Book of Felix Würtz (1598), the treatise of J. C. G. Jörg (1816), the writings of Underwood, Charles Badham, Rilliet and Barthez on poliomyelitis, the work of Jean-André **Venel** at Orbe (1780–91), of the elder Graefe, Dieffenbach, Stromeyer and Gustav Simon in plastic surgery and the work of the **Heine family.** The founder of this famous group of surgical mechanicians and orthopedists was Johann Georg Heine (1770–1838), of Lauterbach (Württemberg), who became surgical instrument maker and bandagist to the University of Wurtzburg in 1802. Being in friendly touch with the elder Langenbeck and other prominent German surgeons of his time, he soon learned the essentials of anatomy and the mechanical side of surgery, invented many important appliances, published several extensive catalogues of his business output, erected the Caroline Institute of Orthopedics (1816) and became orthopedist and assessor to the Medical Faculty of the University. His son Joseph von Heine (1803–77), became a well-known physician, and his nephew Bernhard Heine (1800–46), continued the business, invented the osteotome (1830), did experimental surgery on dogs, for which he won two Monthyon prizes (1835, 1838), and became professor of experimental physiology in the Wurtzburg High School. The other nephew, **Jacob von Heine** (1880–79), of Lauterbach, graduated in medicine at Wurtzburg (1829), founded on orthopedic institute at Canstatt (1829), where he made a great reputation, particularly by his classic monograph on infantile paralysis or **poliomyelitis** (1840, 2d ed., 1860), illustrated with interesting plates, and that on spontaneous and congenital dislocations (1842). It was Heine's monograph which first drew modern attention to poliomyelitis. He died, covered with honors, on November 12, 1879. In the later period, Louis Albert Sayre (1820–1900), of New Jersey, introduced jacket suspension in Pott's disease (1877); Albert Hoffa (1859–1907), at Wurtzburg, introduced a well-known operation for congenital dislocations of the hip joint (1890), and Adolf **Lorenz** (1854–), of Vienna, professor of surgery in the University, made a great reputation in Europe and America by his bloodless method of reducing congenital dislocations of the hip-joint by forcible manipulation (1895). The work of Robert Jones in Liverpool, of Royal Whitman in New York, of Abbott, Bradford, Lovett, Osgood, Codman, Goldthwait and the other orthopedists of the New England school belongs to recent surgery.

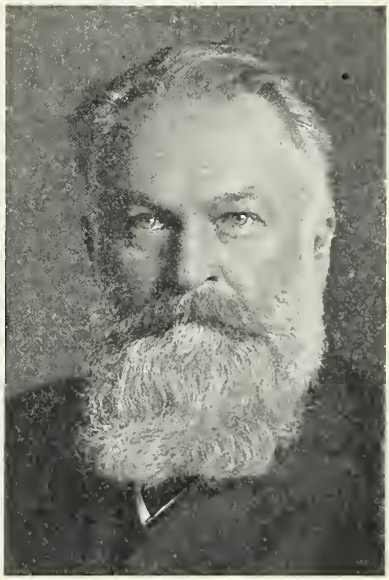

Fig. 35.—Adolf Lorenz (1854–). (Courtesy of Dr. J. H. Hess, Chicago.)

School Hygiene and Pedagogics.—In the eighteenth century, some attention was paid to the untoward effect of close mental work and

sedentary occupations upon the health of the individual. At the beginning of the century, Ramazzini published his treatise on occupational diseases (1700), and later Tissot (1769), Ackermann (1771) and others wrote on the hygiene of literary men. In 1777–88, Johan Peter Frank published the first systematic treatise on public hygiene, in four volumes. The chapter on school hygiene shows the influence of Rousseau. With the single exception of school-lunches, every physical need of the school-going child is considered, and the sentences upon the correct adjustment of light, the effect of the height of benches and the slant of desks upon the eyes and the spine of the pupils, are entirely modern in spirit. After the time of Frank, there is long silence in the records, until, in 1833,* Dr. Edward Reynolds, of Massachusetts, filed a brief for a better understanding of the hygiene of young students by parents and teachers, in particular, the effects of crowded rooms, overstudy at the expense of sleep, unhygienic posture and improper diet. Three years later, C. J. Lorinser published an essay on "The Protection of Health in Schools" (1836),† which deals almost entirely with the crowded courses and the consequent overtaxing of students in the gymnasia, but emphasizes the danger of tuberculosis. This essay excited great interest, was reprinted in 1861, and was the starting point of the German propagandism. In 1842, gymnastic instruction became obligatory in Prussia. In 1862, Max von Pettenkofer published his investigations of the faulty ventilation of schoolrooms and its effects upon the pupils. Sir Henry Acland published a report on the sanitary conditions of the Cowley Industrial School in 1863. In 1865 appeared the papers of Fahrner‡ and Parow§ upon the bad effects of faultily constructed school-desks. Fahrner's work soon attracted the attention of Hermann Cohn, who was, in a very real sense, the founder of hygienic inspection of school-children.

Hermann Ludwig **Cohn** (1838–1906), of Breslau, studied physics and chemistry under Bunsen, Kirchhoff and Helmholtz, taking his doctor's degree in philosophy at Breslau (1860) and in medicine at Berlin (1863), where he was a pupil of Graefe. In 1866, he began to practice ophthalmology at Breslau, where he opened a private eye-clinic, and eventually became professor extraordinarius in the University (1873). His practice gave him an experience of some 20,000 refraction cases. In 1866, he published an investigation of myopia from defective lighting and faulty benches in 7658 school-children. In the following year came his famous monograph on the examination of the eyes of 10,060 school-children for visual defects from unhygienic conditions (1867). He found but little myopia in the village schools, five times as many myopes in the elementary schools of cities, 15 times

* Reynolds, On the Importance of a Knowledge of the Principles of Physiology to Parents and Teachers, Boston (1833).

† Lorinser, Zum Schutz der Gesundheit in den Schulen, Med. Ztg. Berlin, 1, (1836), pp. 1–4.

‡ Fahrner, "Das Kind und der Schultisch." Zürich (1865).

§ Parow, Ueber die Nothwendigkeit einer Reform der Schultische, Berlin Schul.-Ztg. (1865).

as many in the Realschule and 20 times as many in the gymnasia. In this field, Cohn had been preceded by James Ware, who in 1812, examined the eyes of 1300 boy cadets in the Military School at Chelsea (England), by a government investigation of myopia in the school-children of the Grand-Duchy of Baden (*circa* 1840), by Szokalki's investigations of school-children in Paris (1848), by Jäger in Vienna (1861) and by Rüte in Leipzig (1865). Although Cohn drew from his figures the erroneous conclusion that the degree of visual defect is a mathematical function of the number of years of school-life, instead of the individual age as affected by heredity (Fulton)* and although the preponderance of male myopes in his statistics is easily explained, the real importance of his research lies in his insistence upon the effect of bad lighting, faulty desks and benches, and poorly printed books upon the engorgement of the eye with blood through bending and the increased intraocular pressure and extension of the eye in the vertical plane through reading at close range. This memoir was epochal as awakening the medical public, and as being the starting point of the innumerable school-inspections of various kinds which have since been made. It led to the foundation of the Society for the Prevention of Blindness (1880), which offered a prize of £80 for the best book on the subject (1882), won by Ernst Fuchs (1885).

Cohn meanwhile continued his propagandism along the broadest lines. In 1867–73 he took up the hygiene of schoolhouses, desks and benches, in 1878 the investigation of color-blindness, in 1880 the printing in schoolbooks, in 1882–98 the problem of medical inspection of school-children, in 1883–1902 the lighting of schoolrooms, as tested by the Weber photometer, in 1894 the color of window curtains; in 1896, he made a collective investigation of infantile conjunctivitis in the Germanic countries, and in 1903–4 he introduced regular inspection of the eyes of school children. In 1894, he published his paper on masturbation in children and in 1904, his brief for sexual instruction of the child. His monograph on the hygiene of the eye in school children (1883) became a *Lehrbuch* in 1892. Perhaps the culmination of his work was his examination of the vision of 50,000 Breslau school children (1899), in which it was shown that 85 per cent. had supernormal vision but with a continual increase in visual defect as they mounted from class to class. In this examination, Cohn used his own hook-shaped test-types, instead of letters, which were more readily guessed by the pupils. He lived to see the first Congress of School Hygiene (Nuremberg, 1904).

Cohn was a man of jovial, good-natured appearance, a true philanthropist who cheerfully taught all his life as an unpaid extraordinarius, and spent 50,000 marks upon the upkeep of his private clinic, at which 58,481 patients were treated (1866–94), of whom 39,362 (67 per cent.) were charity cases.†

In 1869, Rudolf **Virchow** published his well-known report on school-hygiene,‡ which supported Cohn in his views about myopia and dealt

* I am indebted to Dr. John S. Fulton, Secretary of the State Board of Health of Maryland, for this information.

† For a spirited account of Cohn's life and work, with a full bibliography of his writings, see F. Erismann, Ztschr. f. Schulgsndhtspflg., Hamburg & Leipzig, xix (1906), pp. 829–880.

‡ R. Virchow, Ueber gewisse die Gesundheit benachtheiligende Einflüsse der Schulen," Berlin (1869).

successively with the effects of cerebral congestion (headache, epistaxis, school children's goitre), spinal curvature, phthisis, digestive and sexual disorders, contagious diseases, wounds and injuries, ventilation, lighting, posture, exercise, mental overwork, corporal punishment, drinking water, etc.

Sir Edwin Chadwick wrote "On Schools as Centres of Children's Epidemics" (1871), and the "Sanitary Principles of School Construction" (1871). Baginsky published his Handbook of School Hygiene in 1879. After this time, the subject became *à la mode*. At the fourth International Congress of Hygiene (Geneva, 1882), the question of medical inspection of schools and school-children by trained physicians (*Schularztfrage*) was introduced and was much debated through the next twenty years. In course of time, medical as well as special inspection of the eyes, ears, nose, throat and teeth became established, anthropometric and psychophysical measurements were made, and the hygiene of the model school-house, its furniture, lighting and appointments, was carefully studied. **School-lunches,** for children, inaugurated by **Count Rumford** at Munich (1792), revived in the military *Caisse d'écoles* at Paris (1849) and by **Victor Hugo** at Guernsey (1866), were established by law in France as *cantines scolaires* (1882); while in Germany, the movement, started at Munich in 1876, had extended to half the cities in the empire by 1909. School-lunches were introduced in England in 1902 and in New York City on November 23, 1898. **Dental clinics** were started at Strassburg and Darmstadt in 1902. In, 1915, there were 120 in Germany. A Congress of School Hygiene and Physiological Pedagogics was held at Paris on November 1–2, 1903. The first International Congress of School Hygiene was held at Nuremberg on April 4–9, 1904, the second at London, 1907. As part of school hygiene, the subject of mentally deficient or "unusual" children soon began to loom large. Feeble-minded and half-witted children were roughly handled in the past. At Dessau, Martin Luther opined that an idiot child was possessed by the devil and thought drowning none too good for it. In 1801–7, J. E. M. **Itard** published his reports on the wild boy of the forest of Aveyron (*le sauvage de l'Aveyron*) which was reprinted by Bourneville in 1894. Goggenmos founded a training school for cretins at Salzburg, which died out in 1835. Sometime after, **J. Guggenbühl** (1816–63) founded a similar institution upon the Abendberg, near Interlaken, based upon the idea that the sunshine of the Alpine heights was good for cretins.

Numerous reports were published, but an unfavorable investigation by the Swiss government (1888) closed Guggenbühl's institution and he died in obscurity. In 1837, Edouard **Seguin** (1812–80), of Clamecy (Nièvre), a pupil of Itard, began to treat an idiot boy of Paris and published his results in 1839. In the meantime, G.-M.-A. Ferrus and Felix Voisin had started schools for idiots at Bicêtre, to which, in 1842, Seguin was appointed to carry out his method. This method is set forth in Seguin's publications on the education of infants (1843), on graded images for the use of backward children (1843) and

his treatise on the moral treatment, hygiene and education of idiots (1846). In consequence of the revolution of 1848, Seguin emigrated to the United States, where he wrote the pioneer treatises on clinical thermometry (1871–76) and continued his pedagogic work on idiocy, in which he was a forerunner of Maria **Montessori**. Her lectures on the education of backward children led to the foundation of the Scuola ortofrenica at Rome, of which she was directress (1898–1900). Her method is set forth in her *Anthropologia pedagogica* (1911). The education of the blind deaf-mute Laura Bridgman (1829–89) by Samuel G. Howe (1801–76), of Boston, was another triumph in pedagogics. The account of Laura Bridgman (1879) by Granville **Stanley Hall** (1846–), was the starting point of his pioneer work in child-study. The series of graded tests for mental retardation, introduced by Alfred **Binet** (1857–1911) and Theodore **Simon** in 1905–8, are now extensively used in school inspection and elsewhere to segregate defective children and adults. Stanley Hall's Adolescence (1904) and Aspects of Child-life and Education (1907), E. Claparède's Child Psychology (1909), Pastor K. H. G. Witte's Education of Karl Witte (1914), George W. Jacoby's Child Training (1914) Dr. Helen MacMurchy on the Organization and Management of Auxiliary Classes (Toronto, 1915) and Lewis M. Terman on the Intelligence of School Children (1919) may be mentioned. For the huge literature of child study and pedagogics, the reader must be referred to the bibliographies of Stanley Hall (1886), Arthur MacDonald (1899), W. H. Burnham (1914), J. T. MacManis (1916) and others.

Children's Hospitals.—The early history of children's hospitals goes back to the transition from the private, personal, egotistical charity of the Romans (enslavement of foundlings) to corporate charity under the influence of Christianity. This became dynastic under Constantine the Great (322 A.D.), patriarchal and clerical under Justinian (533), institutional with Guy of Montpellier (1180), corporate and non-clerical with the silk-makers of Florence (1211), state-institutional under Louis XIV (1670) and philanthropic and national in France and Russia at the end of the 18th century (Hügel).*

Archbishop **Datheus** founded the first authentic foundling asylum in 787 at Milan. This was followed by similar institutions at Bergamo (982), Laibach (1041), Padua (1097), Florence (Spedale di S. Maria della Scala, 1161), and the hospital founded by Guy and his Order of the Holy Ghost (1144) at Montpellier (1180). A bull of Innocent III states that this order had created nine foundling asylums in 1198. Another bull of the same Pope lists 29 foundling asylums in France under Philip IV (The Fair). Other asylums were founded at Arezzo (1188) and Florence (1193), and in 1198, Innocent III provided the *Conservatorio della Ruota*, in the Ospedale dello Santo Spirito in Rome, with accommodations for 600 foundlings, and a rotary contrivance (*ruota*) for receiving them at the door In the thirteenth century, asylums were founded at Parma (1201), Aix, Toulon, Novarra and Volterana (1201), Prato and Jerusalem (1210), Florence

* Hügel, F. S., Beschreibung sämmtlicher Kinderheilanstalten in Europa, Vienna (1849), which contains a full account of children's hospitals in Europe up to the date of its publication. For the history of foundling asylums, see his "Die Findelhäuser und das Findelwesen Europa's." Vienna (1863).

(1218), Bellinzona (*circa*, 1250), Gimignano (1258), Lucca (1268), Embeck (1274), Cortona (1286) and Tauris (1294). In the fourteenth century, the Hôpital de l'Esprit Sainte was founded at Paris (1362), first for the reception of foundlings, later for legitimate children only (1422). This had been predeced by an institution of similar name, founded by Enrad Fleinz at Nuremberg (1331), and was followed by another at Venice (1380). On October 25, 1421, the famous Ospedale degl' Innocenti was founded at Florence, in 1426, the Pio Istituto degl' Esposti at Verona, and others at Genoa (1420), Bergamo (1438), Brescia (1447), Mantua (1449), Cremona (1450), Lodi (1458), Como (1468), Cremona (1479), and Munich (1489). In the sixteenth century, foundling and orphan asylums were erected at Locarno (1501), Reggio (1513), Naples (1515), Pistoja (1539), Paris (Hôpital de la Trinité, 1545), London (Christ's Hospital School, 1553), Piacenza (1573) and Amsterdam (1594).

It is not probable that any of the early medieval establishments were true hospitals (in the sense of being places where disease was actually treated) but merely places of refuge and shelter. It was only at the end of the fifteenth century, as Sudhoff has shown, when physicians began to give the inunction, sweating and guaiac treatment of syphilis in hospital, that the hospitals for "*curabiles, ergo curandi*" began to spring up alongside of hospitals set apart for incurable cases and isolation hospitals for lepers and epileptics.*

In 1639, **St. Vincent de Paul** (1576–1660), who had a worthy precursor in St. Thomas of Villanueva (1488–1555), moved the asylum founded by an unknown widow in the rue St. Landry, Paris ("La Couche," 1638) to the Faubourg St. Victor, to become the *Hospice des enfans trouvés* (1640) which was declared a public institution by Louis XIV, in June, 1670. Other foundling and orphan asylums existed at Hamburg (1604), Dresden (1618), Toledo (1629), Wurtzburg (1639), Peking (1662), Mainz (1665), Erfurt (1664, 1669), Brunswick (1677), Frankfurt (1679), Bremen (1692) and Berlin (1697); and in the eighteenth century at Prague (1704), Novgorod (1708), Hamburg (1709), Edinburgh (1732), Rio de Janeiro (1738), London (1739), Vienna (1742), Turin (1748), Strassburg (1748), Copenhagen (1753), Stockholm (1753), Moscow (1762), Petrograd (1770), Dublin (1781) and London (1789).

The first dispensary for children in Europe was that started by Dr. George **Armstrong** in London (1769–81). This was followed by the institution founded by Johann Joseph Mastalier in Vienna (1787), which was continued after his death by Leopold Anton Gölis (1794) and still exists. The Royal Sea-bathing Infirmary and National Hospital for Scrofula was founded at Margate, England in 1796. In 1785, at the instance of Louis XVI, a commission of the Académie des Sciences (Bailly, Laplace, Lavoisier, et al.) prepared a report on the wretched accommodations, appointments and hygienic status of the Hôtel Dieu, in which eight to nine children were found lying in one bed, with an almost total mortality. In 1788, J. R. **Tenon** made his famous report and recommendations for reforms in hospital construction and hygiene. As a result, the foundling asylum known as the "Maison de l'Enfant Jesus" (1751) was transformed into the present Hôpital des enfans malades (1802). This was for a long time, the largest children's hospital in Europe.† A children's dispensary was founded at Brünn by Dr. Ringolini (1810), Armstrong's London Dispensary was revived by John Bunnell Davis (1816) and followed by a hospital at Vienna (1826). The Nicholas Children's Hospital was founded at Petrograd by Dr. Friedeberg in 1834, the pediatric clinic in the Charité at Berlin in 1834. Others followed at Dresden (1834), Vienna (L. Mauthner, 1837), Budapest

* Pagel-Sudhoff, "Einführung in die Geschichte der Medizing 2. Aufl." Berlin, (1915), p. 188.

† For the history of the Hôpital des enfants malades (1802–1913), see P. Lereboullet, Paris méd., XIV (1913–14), suppl., pp. 3–19.

(1839), Hamburg (1840), Stuttgart (1842), Prague (Kaiser Franz Joseph, 1842), Vienna (St. Joseph's, 1842), Moscow (1842), Frankfurt (1843), Turin (1843), Berlin (Elizabeth Hospital, 1843), Graz (1844), Berlin (Louisa Hospital, 1844), Lemberg (by regimental surgeon Brum, 1845), Stockholm (Pediatric Clinic, 1845), Turin (Ospedaletto di Santa Filomena, 1845), Copenhagen (Börnehospital by J. L. Dreyer, 1846), Munich (1846), Constantinople (1847).

Children's hospitals in England and America date from the middle of the nineteenth century. About 1849, Dr. Charles **West,** of London, attempted to convert the Royal Infirmary for Sick Children in Waterloo Bridge Road (1816) from a scattered set of dispensaries into a true hospital for sick children, but was frustrated by the professional jealousy of his colleagues. In spite of these rebuffs, he visited all the London hospitals, wrote to all the continental children's hospitals for data, and through the social prestige of Bence Jones, he at length secured a footing and a fund for his project. After much opposition and many disappointments, after West had travelled over France and Germany for further information, the Hospital for Sick Children in Great Ormond Street was opened (February, 1852), in a house which had once been occupied by the celebrated Dr. Richard Mead. Mead's drawing room, with its painted shepherds and shepherdesses, became the girl's ward, and his museum the out-patient department. Dr. West and his wife did all the furnishing. West himself organized the system of accounting, the diet table, the Samaritan Fund, the system of boarding out in cottages, the Museum of Anatomy, drew up the catalogue, acted as physician-in-chief and later started an infant nursery or crèche and a convalescent branch in Cromwell Street. The hospital thus accommodated 75 patients and 52 convalescent patients. During 1852, it took in 143 patients and 1250 out-patients, during 1871, 998 patients, and 11,988 out-patients, during 1852–71, 10,442 patients and 200, 691 out-patients. Dr. West resigned in 1875, and did not apply for his position again, but when the hospital was rebuilt (in 1875), he furnished it again throughout and gave it his library and pathological drawings.* A brilliant account of the Hospital was written by Charles Dickens in 1852. Dicken's speech of February 9, 1858, in behalf of this institution is one of the finest specimens of his genius. Miss Mulock, Tom Hood and others also lent their pens to its aid. The hospital was further enlarged in 1892, 1899 and 1908, and now has 240 beds, a Private nursing institution, a medical school in affiliation with London University, at which Garrod, Still, Poynton and Hutchinson are teachers, a casualty department and the largest out-patient service in the world.

The other children's hospitals of London are the Kensington Dispensary (1840, rebuilt 1901), The Belgrave (1863, 1903), Grosvenor (1866), Victoria, Chelsea (1866), Northeastern (Queen's), Bethnal Green (1867), Alexandra (Hip Disease, 1867, 1894), East London (1868), Evelina (1869), Sydenham Road (1872), Cheyne, Chelsea (1874), St. Monica's Home (1874), Paddington Green (1883, 1895, 1911), St. Mary's Plaistow (1893), Infant's Hospital, Vincent Square (1903, 1907), Woolwich (1905), Queen Mary's (1907) and Park Hospital, Lewisham (1910). The largest of these are the East London and the Evelina. The Provincial chil-

* Brit. Med. Jour., London, i (1898), p. 922.

dren's hospitals of England are: Kidderminster (1821, 1870), Manchester (1829, 1903, 1907, 1912), Liverpool Infirmary (1851, 1868), Leeds (1853), Jenny Lind Infirmary, Norwich (1853), Manchester (1855), Bristol (1857, 1885), Newcastle (1861, 1888), Sunderland (1864), Gloucester (1867), Brighton (1868), Nottingham (1869), Birkenhead and Wirral (1869), Hull (1872), Sevenoaks (1872), Cheltenham (1874, 1901), Sheffield (1876, 1896, 1902, 1906), Derbyshire (1877), Bradford (1883), Newbury (1886), Gateshead (1887) Rosehill (Babbicome, 1888, Torquay, 1902), Heswall, Cheshire (1899, 1908).

In Scotland: the Royal Edinburgh (1859, 1895), Royal Aberdeen (1897), Edinburgh (1878, 1885), and Royal Glasgow (1883). In Ireland, the National, at Dublin (1821), the Dublin Children's Hospital (1872, 1874), Ulster, Belfast (1872, 1911–12), Belfast (1873, 1885) and Victoria, Cork (1874). In Canada: Toronto (1875). In India: Bombay (1876). In Australia, those at Melbourne (1870), Adelaide (1876), Brisbane (1877), Rockhampton, Queensland (1885) and Perth, West Australia (1909).

Among the many children's hospitals founded on the continent of Europe after 1850 are those at Stettin (1851), Paris (Sainte Eugénie, 1854), Stockholm (Crown Princess Louisa, 1854), Wildbad-Ludwigsburg (1854), Leipzig (C. Hennig's Polyclinic, 1855), Petrograd (1855), Basel (1862), Berne (Jenner, 1862), Amsterdam (Emma, 1865), Zürich (1868) Petrograd (Prince Peter Oldenburg, 1869), Havre (1875), Vienna (Kronprinz Rudolf, 1875), Cracow (St. Ludwig's, 1876), Dresden (1878), Helsingfors (1879), Vienna (Carolina, 1880), Cremona (1881), Naples (Lina, 1881), Madrid (Infant Jesus, 1882), Oporto (Maria Pia, 1883), Moscow (St. Olga, 1887), Berlin (Kaiser und Kaiserin Friedrich (1890), Genoa, 1890), Leipzig (1893), Dürkheim (1894), Constantinople (Hamidié, 1898), Athens (St. Sophia, 1900), Nancy (J. B. Thierry, Maxésville, 1900), Paris (Bretonneau, 1900, Trousseau, 1900, Pasteur, 1900), Paris (Hérold, 1901), Parma (1901), Paris (Polyclinique H. de Rothschild, 1902), Berlin, University Clinic, Charté 1903, Bordeaux (suburban hospital at Bouscat, 1903), Cremona (1904), Rostock (Clinic, 1905), Lodz (1906), Budapest (1907), Frankfurt am Main (Annie Stiftung, 1908), Lublin (1911), Vienna (New University Hospital, 1911), Venice (Umberto, 1912) and Warsaw (1912).

In 1852, one "Philopedos," an ex-dispensary physician of New York City published "A Few Remarks about Sick Children, and the Necessity of a Hospital for them." Like the hero of the old Spanish play, Philopedos remained *un hombre sin nombre,** but this particular *hombre,* through his insistence upon the high mortality of infants from ill-ventilated, unsanitary habitations and the crowded condition of the general hospitals, was instrumental, as Adams says "in establishing the Child's Hospital and Nursery—the first hospital devoted to children on this continent—which was organized March 1, 1854, and stands to-day as a monument to this unknown writer."† This hospital was also a maternity at the start. The first institution designed exclusively for children was the Children's Hospital of Philadelphia, established in the following year (1855).

Among the later American children's hospitals are those at Chicago (Mary Thompson, 1865), Boston (1869, rebuilt, 1914), New York Foundling (1869), New York (St. Mary's 1870), New York Free Dispensary (1871), Washington, D. C. (1871), Radnor, Pa. (1873), Atlantic City (1873), Albany (1875), Lawrence, Mass. (1875), San Francisco (1875), Philadelphia (St. Christopher's, 1876), Philadelphia (Children's Homœopathic, 1877), St. Louis (1879, rebuilt, 1914), Boston (Infant's, 1881), Cincinnati (1883), St. Louis (Martha Parson's Free, 1884), Chicago (Children's Memorial, 1884), Baltimore (Thomas Wilson Sanitarium,

* Tirso de Molina, El Burlador de Sevilla, act I, sc. I.

† Adams, S. S., Tr. Am. Pediat. Soc., N. Y., ix (1897), p. 23.

1884), New York (Laura Franklin, 1886), San Francisco (1886), Detroit (1887, 1896), New York (Babies,' 1887), Syracuse (1887), Buffalo (1892), Columbus, Ohio (1892), Milwaukee (1892) and Los Angeles (1913). The Baby's Hospital of Philadelphia (1921) is a social service center, combining a small pediatric ward with a research institute, a new departure in the matter of raking pediatric service to the people. The many seaside hospitals and stations for tuberculous children can only be referred to. There are no less than 18 on the Italian coast alone.

Clinical instruction in pediatrics was first introduced by Rosenstein in Sweden (Jacobi). In 1761, the chief physician of the Lying-in Hospital of Stockholm was ordered, by royal mandate, to lecture on infantile diseases (Medin). During the nineteenth century, pediatric teaching was for a long time exploited by means of lectures, in which, of course, such men as Trousseau, Roger, Bouchut and Parrot in Paris, Charles West in London, the Viennese clinicians (Mayr, Widerhofer, Escherich), and in Berlin, Henoch and Gerhardt were most effective teachers. On April 2, 1845, T. T. Berg was appointed professor of pediatrics in the Karolin Medico-Chirurgical Institute and on May 2, 1845, a pediatric clinic was opened at the Central Home for Children. In America, Jacobi introduced bedside teaching in his earliest courses (1862–64). This was revived in 1898, when Jacobi's pupil, Francis Huber, supplied the funds for a special service of bedside teaching at the Roosevelt Hospital for the benefit of the pupils of the College of Physicians and Surgeons. In 1910, Mrs. A. Woerishoffer donated $100,000 for the foundation of the Jacobi Division of the German Hospital, in charge of Dr. A. L. Goodman. This, Jacobi characterizes as the third phase of bedside teaching in pediatrics. In the Paris Faculty, says Hutinel, "Roger (1853) taught as a clinician, Parrot (1878) as an anatomist, Grancher (1885) as a hygienist." During Parrot's incumbency at the Hôpital des enfants assistés, the cradles of the nursling patients were jumbled closely together, without regard to possibilities of infection, the same half-wiped spoon served to examine all throats, the same thermometer, barely wiped upon an apron, served for all rectal temperatures, the bed-linen was never disinfected, the mattresses were soiled with dejecta, the milk, in open crocks, absorbed all dust at sweeping, and the crying infant was quieted by a piece of crumbled biscuit knotted in a rag, dipped into a jar containing a gummy syrup. The aphthæ, vomiting, diarrhea and fever which resulted from this régime were dubbed by Parrot "athrepsia." With the advent of Grancher (1885), a new order of things obtained. Forks, spoons, goblets and other utensils were sterilized, bed-linen and floors were disinfected, the personnel were required to keep themselves clean and not approach an infectious case without donning a surgical blouse beforehand.* Much was learned about the management of infectious cases from Grancher's wire cages about the beds (1889), which were displaced by the system of glass boxing (*boxes vitrés*) of Hutinel (1894), a system frequently copied, especially in von Pirquet's

* Hutinel, L'enseignement de la pédiatrie à la Faculté de Paris. Ann. de méd. et chir. infant., Paris, xii (1908), pp. 37–50.

clinic in the New University Children's Hospital at Vienna. The leading Parisian clinics are those of Hutinel at the Hôpital des enfants malades, Variot at the Hôpital des enfants assistés and Netter at the Hôpital Trousseau. In London, Still's great outdoor service at the Great Ormond Street Hospital is the largest in existence. More than 3000 in-patients and as many as 100,000 out-patients are sometimes treated annually. Sir Robert Jones's clinic at Liverpool is a great centre for infantile orthopedics. In Leipzig, Heubner had, at the start, only a district polyclinic, but through his exertions, a new Children's Hospital (1893), with clinic was acquired. Although the French, Swiss and Austrian medical faculties are all provided with pediatric clinics, only ten of the twenty German universities were so provided in 1910, and, in only eleven was instruction given by a professional pediatrist.* At Berlin, the science of infant nutrition, as taught by Finkelstein and Meyer, is the feature of pediatric instruction. At Munich, Pfaundler's clinic is one of the best ever organized. He has claimed that he has more assistants than patients. This clinic is eminently modern in intention, devoted mainly to prophylaxis and infant welfare. At the Milk Station, modified milk and tea are given out freely to the poor. Bottles are sterilized by means of a gigantic wheel arrangement. The Normal Infant Clinic is designed, like that of Toronto, to keep the infant in sound health from day to day. In the United States, very superior instruction has been given by such able organizers as Rotch and Morse (Boston), Jacobi, Holt, and Chapin (New York) Howland (Baltimore), Abt (Chicago), Lucas (San Francisco), Sedgwick (Minneapolis), Hoobler (Detroit), Cowie (Ann Arbor), Veeder (St. Louis), and by such men as Northup in the Presbyterian Hospital and Koplik in Mount Sinai Hospital (New York).

Pediatric Societies and Periodicals.—In 1860, the New York Academy of Medicine attempted to form a section for Diseases of Children, but after a few tentative meetings the project was abandoned, and not until 1887 was the present Pediatric Section organized, with J. Lewis Smith as chairman. Meanwhile, the American Medical Association organized a special Pediatric Section in 1880, with Dr. A. Jacobi as its first chairman, and this has continued to date. The British Medical Association has a similar arrangement, but the meetings of the section have not been annual but occasional. In 1883, the Gesellschaft der Naturforscher und Aerzte established a pediatric section, meeting annually. In the same year, the *Gesellschaft der Kinderheilkunde* was founded (September 18, 1883) by Gerhardt, Henoch, Demme, Steffen, Soltmann and others, holding its first meeting at Freiburg. The first presidents were Steffen (1883–1900), Heubner (1900–1906) and Escherich (1906). The transactions (*Verhandlungen*, 1883–1913) are of a high order of merit. A Milk Commission of the Society was formed by Soltmann, Biedert, Heubner and Escherich in 1897. Russian pediatric societies were founded at Moscow (1885) and Petrograd (1892), and publish transactions. The American Pediatric Society was organized in 1888, with Dr. A. Jacobi as its first president, his successors in office being J. Lewis Smith, Rotch and Osler. This society is an exclusive organization of the type described by Weir Mitchell: "a meeting of men whose power to teach others is a pledge to that humility which is ever seeking to learn. It has no medical politics, nor is it embarrassed by useless idlers who look upon such gatherings as merely pleasant social meetings."† Its

* Feer, E., Arch. f. Kinderheilk., Stuttgart, lii (1909–10), pp. 244–259.

† Mitchell, Tr. Cong. Am. Phys. & Surg., ii (1892), p. 159.

membership is limited to 75 and confined to the serious workers of scientific type. The Transactions (1888–1921) contain the best kind of pediatric literature. Several local American pediatric societies have been formed, notably the Ohio State Pediatric Society (1895), the Bethesda Pediatric Society of St. Louis (1895), the Philadelphia Pediatric Society (1896), the Indiana State Pediatric Society (1897), the Chicago Pediatric Society, the Central States Pediatric Society, and the New England Pediatric Society. There is also the National Association for the Study and Education of Exceptional Children (1905), the Association of American Teachers of Diseases of Children (1907), the American School Hygiene Association (1907), the American Association of Medical Milk Commissions (1907) and the American Association for the Study and Prevention of Infant Mortality (1909). which became the American Child Hygiene Association in 1919. The Society for the Study of Diseases of Children, established at London in 1900, has, since November 27, 1908, been merged into the Section for the Study of Diseases of Children of the Royal Society of Medicine (Reports of Society, 1900–1908, Proceedings of Section, 1908–21). The Société de pédiatrie of Paris was established in 1899, and has published Bulletins to date. A French Congress of gynecology, obstetrics and pediatrics was held at Bordeaux in 1895 and published *Mémoires* for several years. An Italian pediatric congress (Congresso pediatrico italiano) was organized in 1890 and published *Atti* for a number of years. Every International Medical Congress (1867–1913) has had a pediatric section. An International Congress of Pediatrics was held at Paris on October 7–9, 1912, and has published its *Comptes-rendus* (Paris, 1913).

The first International Congress of School Hygiene was held at Nuremberg in 1904. An International Milk Federation (*Fédération internationale de la laiterie*) has held Congresses at Brussels (1903), Paris (1905), The Hague (1907), Budapest (1909) and Stockholm (1911). A *Union internationale pour la protection de l'enfance du premier âge*, has for its function the organization of Congresses of Milk Stations, has held one Congress at Budapest (1905) and is the parent of International Congresses for the Study and Prevention of Infant Mortality held at Paris (1905), Brussels (1907) and Berlin (1911).

According to Crozer Griffith,* the earliest periodical to be concerned with pediatrics was the *Archiv für die Geburtshilfe, Frauenzimmer- und neu-gebohrner Kinderkrankheiten*, started at Jena in 1787. The first periodical devoted exclusively to pediatrics was the *Analekten über Kinderkrankheiten* (Stuttgart, 1834–37). A *Clinique des maladies des enfants* of the Strassburg Faculty for 1837–41 was edited by V. Stöber in 1841. *La Clinique des hôpitaux des enfans*, with Vanier as editor, was published at Paris in 1841–44. The Children's Hospital at Dresden published a *Jahrbuch* for the year 1844–45. The *Jahrbuch für Kinderheilkunde* was started at Vienna in 1857, with F. Mayr as editor and has been continuous to date. The *Archiv für Kinderheilkunde* (1870), the *Kinder-Arzt* (1890) and the *Centralblatt für Kinderheilkunde* (1896) followed. The *Revue mensuelle des maladies de l'enfance* (1883), and the *Archives de médicine des enfants* (1898) are prominent in France. The *Archives of Pediatrics* was started in New York by William Perry Watson in 1884, and *Pediatrics* by George Carpenter in 1895. La *Pediatria* was started at Naples by Francesco Fede in 1893. The monthly *Dietskaya meditsina* (Moscow, 1896–1903) was in its time the principal Russian periodical.

The *British Journal of Children's Diseases* was established in London by George Carpenter in 1904. The *American Journal of Diseases of Children*, the best pediatric periodical in English was started in 1911.

A list of pediatric journals and transactions, arranged in chronological order is subjoined:

* Crozer Griffith, J., P. "Jour. Am. Med. Assoc." Chicago XXI (1898) pp. 947–951.

PERIODICALS AND TRANSACTIONS DEVOTED TO PEDIATRICS EXCLUSIVELY

Bibliothek für Kinderärzte. v. 1. 8°. Vienna (1792).

Analekten über Kinderkrankheiten. ed. Riecke. Hfte. 1–12. 4 v. 8°. Stuttgart (1834–37).

Clinique (La) des hôpitaux des enfants. ed. Paul Prosper Vanier. v. 1–4. 8°. Paris (1841–44).

Journal für Kinderkrankheiten. ed. Barthez, Berg [*et al.*] v. 1–59. 8°. Berlin (1843–7); Erlangèn (1848–72).

Oesterreichische Zeitschrift für Kinderheilkunde. ed. B. Kraus and L. Mauthner. v. 1–2. 8°. Vienna (1855–57).

Jahrbuch für Kinderheilkunde und physische Erziehung. ed. Fr. Mayr. v. 1–8. 8°. Vienna (1857–66); n.F. ed. Prof. Binz [*et al.*]. v. 1–97. Vienna (1867–1922).

Jahrbuch für Physiologie und Pathologie des ersten Kindesalters. ed. Ritter von Rittershain. v. 1. 8°. Prague (1868).

Oesterreichisches Jahrbuch für Paediatrik. ed. Ritter von Rittershain and Maximilian Herz. v. 1–8. 8°. Vienna (1870–77).

Central-Zeitung für Kinderheilkunde. ed. Adolf Baginsky and Alois Monti. v. 1–2. 40. Berlin (1877–79).

Archiv für Kinderheilkunde. Founded by Adolf Baginsky, M. Herz, A. Monti (1880–92); ed. Baginsky, Monti and A. Schlossmann 1892–1922. v. 1–71. 8°. Stuttgart (1880–1922). Current.

Gesellschaft für Kinderheilkunde. Verhandlungen. v. 1–30. 8°. (1883–1913).

Revista de enfermedades de niños. Redactada por el cuerpo facultátivo del Hospital del Niño Jesus. v. 1. 8°. Madrid (1883).

Archivio di patologia infantile. ed. Luigi Somma. v. 1–6. 8°. Naples (1883–88) .

Bulletin hygiénique et statistique des enfants du ler âge de la ville d'Algér. . . ed. A. Jobert. No. 1, v. 1. 8°. Alger (1883).

Revue mensuelle des maladies de l'enfance. ed. Cadet de Gassicourt and L. A. de Saint-Germain. v. 1–25, Paris (1883–1907). 8°.

Archives (The) of Pediatrics. ed. William Perry Watson. v. 1–39. 8°. Jersey City, N. J. (1884); Philadelphia (1884–91); New York (1892–1922).

Archivos de medicina y cirugía de los niños. ed. Baldomero Gonzalez Alvarez. v. 1–5. 8°. Madrid (1884–89).

Obshtshestvo Dietskich Vrachei v. S.-Peterburg. Trudi I–X (1885–96). [Society of Pediatricians . . . Memoirs.] 8°. St. Petersburg (1887–96).

Archivio italiana di pediatria. ed. Giuseppe Somma. 2 s. v. 7–12. 8°. Naples (1889–94). Ended.

Revista de enfermedades de la infancia. ed. Jaime Guerra y Estape. v. 1. 8°. Barcelona (1890).

American Pediatric Society. Transactions. 8°. [Philadelphia] (1890–1922). Current.

Beiträge zur Kinderheilkunde aus dem I. öffentlichen Kinderkrankeninstitute in Wien. 1.–3. Hft., n.F. v. 1–5. 8°. Vienna (1890–93).

Congresso pediatrico italiano. Atti. 1 (1890); 2 (1892); 3 (1898); 4 (1901). 8°. [v.p.] (1891–1902).

Kinderarzt (Der). Zeitschrift für Kinderheilkunde. ed. M. Sonnenburger. v. 1–31. 8°. Berlin and Neuwied; Leipzig (1890–1920).

Boletin del Dispensario ȳ Hospital de niños pobres de Barcelona. ed. Juan Roca. v. 1–7. fol. Barcelona (1891–97).

Igiene dell' infanzia e medicina preventiva. ed. Francesco Rugieri. v. 1–5. 8°. Rome (1892–96).

Obshtshestvo Dietskich Vrachei sostoyashtshiy pri Imperatorskom Moskovskom Universitetie. Trudi. . . v. 1–7 (1892–3 to 1898–9) [Society of Pediatricians at the Imperial Moscow University. Memoirs . . .] 8°. Moscow (1892–99).

Journal de clinique et de thérapeutique infantiles. ed. G. Variot. v. 1–7. Paris (1893–99). Merged in Gazette des maladies infantiles.

Nederlandsche Vereeniging voor Pædiatrie. Voordrachten. . . . v. 1–2. 8°. Utrecht (1893–6).

Pediatria (La). ed. Francesco Fede. R. Jemma. v. 1–30. 8°. (1893–1922). Current.

Médecine (La) infantile. ed. Jules Comby. v. 1–4. 8°. Paris (1894–97).

Centralblatt für Kinderheilkunde. ed. Eugen Graetzer. v. 1–20. 8°. Leipzig, (1896–1915). Current. In 1908, title became; Zentralblatt etc.

Dietskaya meditsina. ed. L. P. Alexandroff. v. 1–8. 8°. Moscow (1896–1903). Ended.

Pediatrics. ed. by Dillon Brown, George Carpenter (*et al*). v. 1–28. 8°. New York and London (1896–1916).

Annales de médecine et chirurgie infantiles. ed. E. Périer. v. 1–18. 8°. Paris (1897–1914).

Médecine (La) infantile. ed. E. Périer. H. Roueche v. 1–27. 8°. Paris (1987–1911).

Pratique (La) de la médecine infantile. ed. E. Périer. v. 1. 8°. (1897).

Archives de médecine des enfants. ed. F. Brun, J. Comby [*et al.*] v. 1–25. 8°. Paris (1898–1922).

Gyermekgyogyaszat [Pediatry]. v. 1–10. fol. and 8°. Budapest (1898–1907). Supplement to: Orvosi hetilap.

Infanzia anormale. Bulletino ufficiale della Società italiana pro anomali. v. 1–14. 8°. Milaro, 1898–1921.

Tuberculose (La) infantile. ed. Léon Dereeq and Henri Barbier. v. 1–10. 8°. Paris (1898–1907).

Conferenze d'igiene infantile tenute per cura del Comitato romano della Società Nazionale Pro Infantia nell' aula dell' Isituto d'igiene di Roma nell' anno (1898). 230 pp., 1 1. 8°. Rome, G. Balbi (1899).

Gazette des maladies infantiles. Journal de pædiatrie. ed. H. Barbier and Villemin. v. 1–14. 4°. Paris (1899–1912). In January, 1900, Journal de clinique et de thérapeutique infantiles merged in this journal, and title became: Gazette des maladies infantiles et Journal de clinique et de thérapeutique infantiles réunis.

Sociétć de pédiatrie de Paris. Bulletins. v. 1–19. 8°. Paris (1899–1921).

Igiene dallà prima infanzia. Atti del primo Congresso nazionale per l'igiene dell' allattamento mercenario (1899). 8°. Milan (1900).

Paedologisch Jaarboek. ed. M. C. Schuyten. v. 1–5. 8°. Antwerp (1900–1904).

Society for the Study of Disease in Children. Reports (1900–1901 to 1907–8). v. 1–8. 8°. London (1901–99).

Congresso per l'igiene dell' allattamento e la tutela della prima infanzia, tenuto in Firenze (1901). Atti. 8°. Florence (1903).

Homœopathic (The) Journal of Pediatrics. ed. J. G. Chadwick. v. 1. Buffalo, N. Y. (1902).

Archivo di patologia e clinica infantile. ed. Tommaso Guida. v. 1–2. 8°. Naples (1902–3).

Gesellschaft für innere Medizin und Kinderheilkunde in Wien. Mitteilungen. v. 1–21. 8°. Vienna (1902–22). Current.

Monatsschrift für Kinderheilkunde. ed. Arthur Keller. v. 1–22. 8°. Leipzig and Vienna (1902–1922).

Revue d'hygiène et de médecine infantiles, et Annales de la polyclinique H. de Rothschild. ed. H. de Rothschild. v. 1–10. 8°. Paris (1902–11).

Congresso nazionale "pro infantia" in Torino (1902). Atti. 8°. Turin (1903).

Gyermekorvos. [The children's physician.] v. 1–12. 4°. Budapest 1903–14). Supplement to Budapesti orvosi ujsag.

Pédiatrie (La) pratique. ed. E. Ausset. v. 1–12. sm. 4° (1903–13).

Rivista di clinica pediatrica. ed. C. Comba, [*et al.*] v. 1–20. 8°. Florence (1903–21).

British (The) Journal of Children's Diseases. ed. George Carpenter. J. D. Rolleston. v. 1–19. 8°. London (1904–22). Current.

Halbmonatsschrift für Frauen- und Kinderkrankheiten. ed. S. Schick. v. 1–2. 8°. Vienna (1904–5).

Philadelphia Pediatric Society. Transactions (1904–5, 1905–6). 8°. New York (1905–6).

Archivos Latino-Americanos de pediatria. v. 1–13. 8°. Buenos Aires (1905–1919).

Jikwa Zasshi [Journal of Pediatrics.] Nos. 75–78. 8°. Tokyo (1906).

Zeitschrift für Kinderheilkunde. ed. H. Finkelstein [et al] Original. Zeitschrift für Kinderfflege. v. 1–9. 8°. Berlin, 1906–14. Referate: Zentralblatt für die gesamte Kinderheilkunde ed. H. Finkelstein v. 1–12. 8°. Berlin (1910–22) Current.

Przeglad Pedyatryczny [Pediatric Review] v. 1–6. .8° Krakow, 1908–14.

Rassegna di pediatria. v. 1–5. 40. Parma, 1910–14. Pediatriya. v. 1–6. 8°. Petrograd, 1911–14.

Pediatría (La) española. v. 1–11. 8°. Madrid (1912–22). Current.

Association internationale de pédiatrie; premier congrès tenu à Paris, les 7, 8, 9, Octobre (1912). 8°. Paris (1913).

Le Nourisson, ed. A.–B. Marfan. v. 1–10. 8°. Paris, 1913–22.

COMBINED OBSTETRIC GYNECOLOGIC AND PEDIATRIC PERIODICALS

Archiv für die Geburtshülfe, Frauenzimmer- und neugebohrner Kinderkrankheiten. v. 1–6 (à 4 Stücke) 8°. Jena (1787–96). Continued by the following.

Neues Archiv für die Geburtshülfe, Frauenzimmer- und Kinderkrankheiten. v. 1 (à 4 Stücke). 8°. Jena (1798–1800).

Annalen der Geburtshülfe, Frauenzimmer- und Kinderkrankheiten. Für die Jahre (1790 und 1791). ed. Jacob Römer. 2v. 8°. Winterthur (1793–94).

Annalen der klinischen Anstalten der Universität zu Breslau, für Geburtshülfe und Krankheiten der Weiber und Kinder. ed. J. W. Betschler. v. 1–2. 8°. Breslau (1832–34).

Beiträge zur theoretischen und practischen Geburtshülfe und zur Kenntniss und Kur einiger Kinderkrankheiten. ed. J. H. Wigand, Heft. 1–3. 8°. Hamburg (1798–1808).

Neues Archiv für die Geburtshülfe, Frauenzimmer- und Kinderkrankheiten. ed. Joh. Christian Stark. v. 1–3. Jena (1798–1801).

Journal für Geburtshülfe, Frauenzimmer- und Kinderkrankheiten. ed. Elias von Liebold. v. 1–17. 8°. Frankfurt am Main (1813–33); Leipzig (1834–38).

Annales de gynécologie et de pédiatrique. Par. Martin Schoenfeld. 2 s., v. 1–2. roy. 8°. Brussels (1840–42).

Annales d'obstétrique, des maladies des femmes et des enfans. ed. Andrieux de Brioude and Lubanski. v. 1–3. 8°. Paris (1842–43).

Nederlandsch Tijdschrift voor Verloskunde, Ziekten der Vrouwen en der Kinderen. ed. J. Broers. v. 1–16. 8°. Utrecht (1846–53).

Nederlandsch Tijdschrift voor Heel- en Verloskunde, Ziekten der Vrouwen en der Kinderen. N.s. v. 1–11. 8°. Utrecht (1854–69). Continuation of preceding.

Tijdschrift der Nederlandsche Gynaecologie en Paedriatiek. ed. H. J. Broers. St. 1–4. 8°. Utrecht (1847–48).

American Journal of Obstetrics and Diseases of Women and Children. ed. by E. Noeggerath, B. F. Dawson and A. Jacobi. v. 1–80. 8°. New York (1868–1919).

Woman's Pacific Coast Journal. ed. Mrs. Carrie F. Young. v. 1–2. 4°. San Francisco (1870–71).

Gazette obstétricale de Paris. ed. E. Vernier (de Villers). v. 1–9. 8°. Paris (1872–80).

Obstetrical (The) Journal of Great Britain and Ireland. With an American supplement. ed. William F. Jenks. v. 1–8. 8°. Philadelphia (1873–80).

Archives de tocologie, des maladies des femmes et des enfants nouveau-nés. ed. J. A. H. Depaul. v. 1–15. 8°. Paris (1874–91).

Obstetric (The) Gazette. ed. Edward B. Stevens. v. 1–13. 8°. Cincinnati (1878–90).

Homœopathic (The) Journal of Obstetrics and Diseases of Women and Children. ed. by Henry Minton. v. 10-26. 8°. New York (1879–1904).

Annali di ostetricia, ginecológia e pediatria. ed. Domenico Chiara [*et al.*] v. 1–37. 8°. Milan (1879–87); Florence (1888–9); Milan (1890–1915).

Anales de obstetrica, ginecopatia y pediatria. ed. Rafael Ulecia y Cardona. v. 1–19. 8°. Madrid (1881–99).

Hygiéne (L') de la femme et de et de l'enfant. ed. Madeleine Brès. v. 1–3. 4° Paris (1883–85).

Tennessee Journal of Medical and Surgical Diseases of Women and Children. ed. by H. J. Wells. Nos. 1–2, v. 1. 8°. Nashville, Tenn (1884).

Archivos de ginecología y enfermedades de la infancia. ed. P. Calderin, Manuel de Tolosa Latour. v. 1–2. 8°. Madrid (1884–85).

Progreso (El) ginecológico y pediatria. ed. Candela Plá. v. 1–3. 8°. Valencia (1884–89).

Revue obstétricale et gynécologique (accouchements, maladies des femmes et des enfants). ed. Apostoli, Boursier [*et al.*] v. 1–12. 8°. Paris (1885–96).

Allgemeine Zeitschrift für Hebammen, Wochen- und Kinderpflege. ed. O. Zeller. v. 1–2. 4°. Stuttgart (1885–86).

Archives (The) of Gynæcology, Obstetrics and Pediatrics. 8°. v. 1–9. New York (1886–94).

Revue pratique d'obstétrique et d'hygiéne de l'enfance. ed. MM. Henri Varnier and Paul Le Gendre. v. 1–26. 8°. Paris (1888–1913).

Progreso (El) ginecologico y pediatria. v. 1–3. 8°. Valencia (1887–89).

Revue obstétricale et gynécologique. v. 5–12. 8°. Paris (1889–96).

Annals of Gynæcology and Pædiatry. Philadelphia. (Title after February, 1890 (v. 3, No. 5) of Annals of Gynæcology, Boston.

Congrès périodique de gynécologie, d'obstétrique et de pædiatrie. Irè. session, Bordeaux (1895). 2. Marseille (1898). 3. (1901). 4 (1904). Mémoires et discussions. 8°. Paris, Marseille, Rouen (1896–1905).

Revue mensuelle dé gynécologie, obstétriquc et pædiatrie de Bordeaux. ed. R. Lefour. v. 1–5. 8°. Bordeaux and Paris (1899–1903).

Obstétrique (L'). ed. P. Budin. v. 1–12. 8°. Paris (1896–1907).

Kalender für Frauen- und Kinder-Aerzte. ed. Franz Eichholz. v. 1–10. 12°. Bad. Kreuznach (1897–1906).

Clinica (La) ostetrica. ed. Felice La Torre. v. 1–9. 8°. Rome (1899–1907).

Societe d'obstétrique, dc gynécologie et de pædiatrie de Paris. Comptes rendus. v. 1–13. 8°. Paris, 1899–1911.

Giornale di ginecologia e di pediatric. ed. A. Pinna-Pintor. v. 1–7. 8°. Turin (1901–7).

Revue pratique (mensuelle) dc gynécologie, d'obstetrique et de pediatrie. ed. Louis Pierra. v. 1–9. Paris (1906–14).

PERIODICALS DEVOTED TO CHILD-STUDY, PEDAGOGICS AND SCHOOL HYGIENE

Société libre de l'étude psychologique de l'enfant. v. 1–31. 8°. Paris, 1882–1913.

Congreso higiénico-pedagógico. Memorias del primer . . . reunio en la ciudad de México cl ano de (1882). 8°. Mexico (1883).

Revista de hygiene y educación de los ninos. ed. Lutgardo Nadal. v. 1–2. (Nos. 1–14). San Fernando (1885–6).

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Zeitschrift für Schul gesundheitspflege. ed. Dr. Kotelmann; P. Stephani. v. 1–35. 8°. Hamburg and Leipzig (1888–1922).

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THE TWENTIETH CENTURY

Social or Preventive Pediatrics

"Spake I not unto you, saying: Do not sin against the child," Genesis, XLII, 22.

In the twentieth century, pediatrics was elevated from its ancillary status as a "dependent dwarf" of ordinary medical practice, into the larger atmosphere of social medicine, of which it is now one of the most important independent branches. This was due to the menace of infant mortality as the chief cause of the depopulation of modern states, with the consequent extension of the science of infant nutrition and metabolism and the creation of the new science of infant welfare, as ways and means of combatting the evil. It has been the universal experience in all times and places, that the mortality of hand-fed infants is higher than that of the breast-fed. In this regard, it is highly significant, as Heubner says, that while the science of infant diseases and their treatment is a plant of almost recent growth, the generic idea of the importance of infant welfare, as the basis of racial or national hygiene, has excited human interest from time immemorial. The modern movement is only the logical expansion of a folk-intuition or *schwebender Gedanke*, which exists, in crude form, even among semi-civilized peoples.

The Science of Infantile (Nutritional) Disorders*

Through the work of Bichat, as we have seen, the attention of Billard and other pediatrists of his time was directed to the post-

* In attempting to deal with the complex subject of infant nutrition and metabolism, I wish to acknowledge my indebtedness to the address of O. Heubner; "Zur Geschichte der Saüglingsheilkunde" (Berlin, 1909), and to the valuable information conveyed by Drs. Isaac A. Abt (Chicago), John Ruhräh (Baltimore) and John Foote (Washington, D. C.).

mortem lesion as the basis of classification of infantile diseases; and this tendency, gathering impetus from the massive achievement of Virchow and Rokitansky, continued straight on to the latter part of the nineteenth century. In other words, it was nowise perceived that post-mortem findings are but end-results of a long series of chemical changes within the body, and that the true cause of disease and basis of classification is to be sought in the initial rather than the final state of these changes. Thus, the classification of gastro-intestinal diseases in infancy was for a long time confused by the Broussais theory of gastro-enteritis and irritation as the basis of pathology, and the concept "softening of the stomach," which John Hunter, and latterly Heubner himself, defined as mere post-mortem auto-digestion (an end-result), was accepted in Billard's time, as a clinical and pathological "entity." Bednar described the various toxemias of infancy with care (1850–53) but he did not see their relation to the disorders of infant nutrition (Heubner).

An apparent step forward was taken when Parrot maintained that severe diseases of infants lead back to some mysterious deep-lying disturbance or "athrepsia," of the whole infantile organism; but Parrot, as Heubner points out, did not reason in terms of metabolism, but again considered only post-mortem findings, and Hutinel maintains that the cause of athrepsia was simply hospital sepsis and the dirty hands of the attendants. The expression "metabolic phenomena" was first employed by Theodor Schwann in 1839 (Fraser Harris). The generic concept (*Stoffwechsel*) was made more familiar in the "Organic Chemistry" of Liebig (1842), who classified the organic foodstuffs, made a thorough investigation of the metabolism of mineral salts, and even made some attempt to improve infant nutrition by the addition of digestible carbohydrates to animal milk as a substitute or "surrogate" for maternal milk (Liebig's Food). In 1837, L. T. W. Bischoff first demonstrated the presence of free oxygen and CO_2 in the blood and studied the urea as a measure of chemical interchange in the body. In 1838, Johann Friedrich **Simon** [1807–43], of Berlin, made a chemical and physiological investigation of human milk in comparison with animal milk.* This, in the opinion of Heubner, is the first real landmark in the exact science of infant metabolism as a basis for rational infant nutrition. The investigation passed unnoticed for some thirty years. "The fundamental concept of disease remained fast-rooted in the anatomical lesion, the theory of treatment conscientiously limited itself to a number of drugs designed to combat that lesion" (Heubner). But the general idea that disorders of infant nutrition are to be treated not by drugs but by correct diet was gaining ground, and the work of Biedert, Jacobi, and others on infant nutrition was not without results. The pediatrists of the Vienna school, Mayr and Widerhofer, attained the most refined semeiology in their

* Simon, J. F., De lacte muliebris ratione chemica et physiologica, Berlin dissertation (1838). Also, German translation, Die Frauenmilch, etc., Berlin, (1838).

clinical delineations, through the use of instruments of precision. Küttner, a Dresden pediatrist of the same type, said frankly "He who would cure sick children must, before all else, know how to feed them." Franz **Soxhlet** furthered the cause of pure milk by introducing the idea of "surgical asepsis in the hygiene of cow-stalls" and the sterilization of milk (Heubner). Epstein and Grancher carried over the same asepsis into the children's wards. In 1878, the obstetrician Friedrich **Ahlfeld** (1843–), at Leipzig, introduced the use of the balance in weighing infants in connection with growth and metabolism;* and a number of women physicians established the basic data by weighing their own infants at suckling during the whole period of lactation. This led to an entirely new concept, that of the "nutritive requirement," of the suckling infant. In the meantime, Carl **Bergmann,** in 1847, emphasized the relation between heat production and surface area of the body,† which was also to be forgotten until Rubner again brought it forward (1883); Voit and Pettenkofer estimated the amounts of proteins, fats or carbohydrates broken down in the body (from the total nitrogen and carbon dioxide eliminated) by a special respiration chamber (1861); and Voit introduced new methods for determining the intake and outgo in the balance of nutrition and the amount of proteid necessary in foods. Paul **Zweifel** demonstrated pepsin in the stomach and diastase in the parotid of the newborn (1874).‡ Joseph **Forster,** in the earliest investigation of the gaseous metabolism of the new-born, made with a Pettenkofer-Voit respiration chamber, showed that the infant produces more CO_2 per unit weight than the adult (1877).§ Epstein studied the duration of gastric digestion in infancy (1880–87). Johann **Kjeldahl** introduced his method of estimating nitrogen content in (1883). Max **Rubner** found, that the metabolism is proportional to the surface energy of the body (1883) and investigated metabolic changes in terms of heat and energy units by calorimetry (1891–1902). Wilhelm **Camerer** introduced the scientific investigation of infantile metabolism in the pediatric clinic (1894). Improved calorimeters, such as those of d'Arsonval (1886), Atwater and Rosa (1897), Atwater and Benedict (1905) were invented; and, in 1898–99, **Rubner and Heubner** published their epoch-making monographs on the average daily food requirements of the normal and the atrophic infant, which are the starting point all of modern work on infant metabolism. The theory of disordered infantile nutrition now followed three distinct and separate trends. **Escherich,** in 1886, first signalized the importance of the bacterial flora of the intestine as pathogenic agents in infantile disease (1885) and postulated an infec-

* Ahlfeld, "Ueber Ernährung des Säuglings an der Mutterbrust; fortlaufende Wägungen während der Säuglingsperiode." Leipzig (1878).

† Bergmann, "Ueber Verhältnisse der Wärmeökonomie der Thiere zu ihrer Grösse," Göttingen (1848).

‡ Zweifel, "Untersuchungen über den Verdauungsapparat der Neugeborenen," Berlin (1874).

§ Forster, "Amtl. Ber. d. 50. Versamml. deutsch. Naturf. u. Aerzte," München (1877), p. 355.

tious, endogenous, toxic gastroenteritis or milk-infection (1900), although no specific bacillus was found. **Czerny and Keller** maintained that disturbances of nutrition may spring from overfeeding, especially with fats, from infection (enteral and parenteral), from inborn defective metabolism (exudative diathesis), and from congenital defects. Czerny drew attention from pathological processes in the intestinal tract to the intermediate metabolism in outlying organs and cells of the body; and the fact that nitrogen was excreted in the urine as ammonia instead of urea suggested an abnormal excess or an insufficient breaking down of acids in the organism. Schlossmann taught the straight doctrine that artificial feeding is "unnatural feeding." Finkelstein, reasoning from clinical appearances, argued that infantile diseases are due to disturbances of balance of nutrition, to dyspepsia (diminished tolerance), to decomposition (Parrot's athrepsia) and to intoxication (enterocatarrh, cholera infantum). In 1906, **Finkelstein** opposed the Biedert theory that casein is harmful, the Czerny theory that fats are harmful, the Escherich theory that bacteria are harmful in the infantile digestive tract, and the Rotch theory of percentage feeding to offset the harmfulness of proteids, and advanced the theory of an alimentary fever from sugar or salt, with a special "albumen milk," to meet these conditions. Finkelstein's *Eiweissmilch*, a mode of therapy rather than an infant food, shows that proteids are not necessarily harmful, but his theory of salt- and sugar-fevers was opposed to such purpose that he himself ultimately abandoned his dogmatic position as to the pyrogenic action of carbohydrates, and finally came around to Czerny's view that fats are more harmful than casein in a bowel previously irritated by sugar fermentation (1910). Ingestion of sugar has been pushed to the point of "sugar-diarrhea" by Orgler (1908), Allen (1913), Talbot and Hill (1914), without any evidence of sugar intoxication. The chief danger of sugar to the infant would appear to be that it is a culture-medium for the growth of bacteria in the intestinal tract. But, whatever viewpoint is assumed, the mystery of the disorders of infant metabolism, which cause the baby to die incontinently or to sink helplessly into dissolution, is still to be unravelled, as Heubner says, in the conditions leading to a pathological lesion of the infantile intestinal tract.

The subject of infant metabolism and nutrition has been a debateable land, made up of the shifting sands of theory. The history of metabolism itself may be likened to a succession of dissolving views. The assemblage of the different theories has all the effect of Schopenhauer's concert of Russian horns, each player producing (in his place) a single isolated note. Ruhräh likens the different ways of approaching metabolism to Saxe's poem "The Six Blind Men and the Elephant." The energy-metabolism is computed1) by measuring the heat lost in the calorimeter,2) by obtaining the heat from the respiratory quotient (volume of oxygen inspired into volume CO_2 expired) in a respiration chamber. The basal metabolism (at absolute rest) is hard to compute in infants, on account of the kicking and crying of the baby, which

increases heat production (Schlossmann and Murschhauser). The large differences between the energy-quotients obtained by Heubner and by Czerny-Keller show that the Heubner school dealt with livelier babies than the Czerny school (Talbot). Finally, after 18 hours fasting in a calorimeter, Schlossmann found acetone appears in the urine (Schlossmann and Murschhauser), suggesting that the baby may have passed from a normal to a pathological condition, beyond which point basal metabolism cannot be computed. In applying the principles of metabolism to infant nutrition, the advocates of a single isolated hypothesis, in comparison with the resourceful therapists, become as Emerson's "monotones, the men of one idea." Jacobi has shown that a marasmic infant, fed up to normal and beyond it by a monotone of *Eiweissmilch*, ultimately developed scurvy, to be relieved again by a more varied diet. Thus to indulge the "vanity of dogmatizing" in the matter of infant metabolism is to join the ranks of those who, in the expression of Harvey Cushing "are today, but may not be tomorrow."*

Scientific Investigation of Infant Metabolism and Infant Nutrition

William **Camerer** (1842–1910) of Urach (Württemberg), a Tübingen medical graduate (1866), served as a medical officer in the Austro-Prussian and Franco-Prussian wars (1866–70), and later specialized in metabolic disorders in his private clinic. He published monographs on obesity (1886), diathetic disorders (1888) and an important treatise on the metabolism and energy requirements of childhood from birth to full growth (1894, 2d. ed., 1896), based upon his own close observations. This won the Stiebel Prize (1898) and was followed by his studies (with Söldner) of the composition of human milk (1895–1903) and of changes of weight in 283 infants in the first year of life.

Johann Otto Leonhardt **Heubner** (1843–), a pupil of Widerhofer (Vienna) and an assistant of Wunderlich (Leipzig), graduated at Leipzig (1867), served as a medical officer in the Franco-Prussian war, and became professor extraordinarius of internal medicine at Leipzig (1873) and director of the University Polyclinic (1876). In 1891, he secured the erection of a children's hospital at Leipzig and became the first professor of pediatrics in the University. In 1894, he succeeded Henoch at Berlin, the first full professorship in Germany, with

* If the above expression of opinion seems exaggerated, let me call attention to Schlossmann's address of 1908 (Deutsche med. Wochenschrift, 1908, xxxiv, (1713–1715), in which he says that "Investigations in infant nutrition are legion, but the master word, fusing all into a harmonious whole, remains yet to be spoken." Schlossmann cites the utterances of Goethe ("Investigations of the first order are all the more valuable, because incomplete, just as those of a lesser order are always completed"); and of Liebig ("Modern physiology lacks a great centric idea to which all investigations must inevitably converge; hence the perpetration of some colossal error in this science would be a positive advantage"). Equally apposite is Lord Bacon's dictum "It is easier to evolve truth from error than from confusion."

the directorship of the Pediatric Clinic and Polyclinic at the Charité. He published contributions to internal military medicine (1871), an epoch making study of syphilis of the cerebral arteries (1874), the articles on syphilis oft he brain and cord and dysentery in Ziemmsen's *Handbuch* (1873–74), a prize essay on experimental diphtheria (1883), essays on cerebral meningitis (1886), scarlatinal diphtheria (1888), infant nutrition and children's hospitals (1879), chronic nephritis and

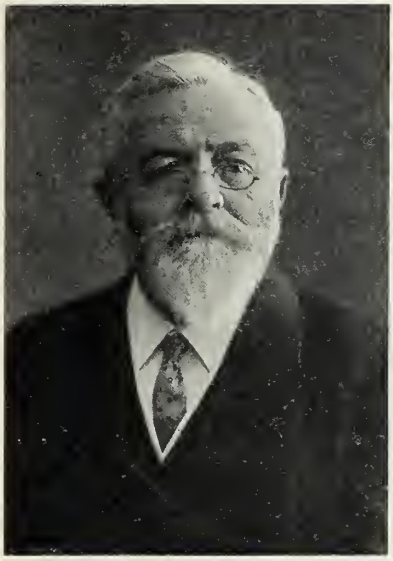

FIG. 36.—Johann Otto Leonhardt Heubner (1843–). (Courtesy of Dr. J. H. Hess, Chicago.)

FIG. 37.—Adalbert Czerny (1863–). (Courtesy of Dr. Henry F. Helmholz, Chicago.)

albuminuria in children (1891), treatment of disorders of infant nutrition (1894), syphilis in children (1896), the metabolism of a boy (1902) a splendid treatise on pediatrics, based upon his own clinical findings, (1903–6, 3. ed., 1911), a valuable history of the pediatrics of infancy (1909) and a volume of pediatric essays (1912). In 1894, Heubner built, with his own hands, the first successful respiration calorimeter. In 1898–9, appeared the classic monographs of Max Rubner and Heubner on the average daily food (energy) requirements of the normal and atrophic infant,* which have remained the basis of all subsequent metabolism experiments on infant feeding. He inaugurated the method of caloric feeding. In 1901 he introduced the concept of the "energy quotient,"† *i.e.*, the number of large calories per kilogram of body weight *per diem* necessary for infant growth. In 1911, he introduced his theory of "digestion insufficiency." He made Barlow's disease known in Germany. Heubner is a distinct leader of modern

* Rubner and Heubner, Ztschr. f. Biol., Munich, xxxvi (1898), p. 1; xxxviii (1899), p. 315.

† Heubner, Ztschr. f. diät. u. phys. Therap., Leipzig, v (1901–2), pp. 13–35.

pediatric thought and an influential teacher, numbering among his pupils Finkelstein, Langstein, Stoeltzner and Salge. Heubner is described by Finkelstein as "nothing of the pompous, prepense Olympian of calculated sublimity and pathetic stage gestures, but a genuine, whole-hearted human man, full of life, movement, fire, natural, original and impulsive in every fibre of his being." In old age, he was not "the ossified, myopic discourager of youth," but carried the younger men along with him by the youthful freshness and charm of his own personality.

Adalbert **Czerny** (1863–), of Szczakowa, Galicia, a pupil of Epstein, graduated M.D. at Prague (1888), and succeeded Soltmann as professor extraordinarius at Breslau (1894), where he founded a Pediatric Clinic and Polyclinic. In 1906, he became full professor, and in 1910, professor at Strassburg, and succeeded Heubner in Berlin in 1913. He published a histological study of degenerative processes in the liver (1890), lectures on the physician as educator of the child (1908, 3. ed., 1911) and with A. Keller, a great treatise on the nutrition and nutritive disorders of childhood and their treatment (1906).* In 1893, he studied the duration of gastric digestion. In 1906, he studied, with Keller, the change in the composition of maternal milk when the breasts are not emptied, the harmfulness of fat and the provenance of fecal fat, and made, with Steinitz, a collective investigation of the nitrogen metabolism of infants. In 1906–8, he introduced his concept of an "exudative diathesis" and the exanthems produced by ingestion of fat in this condition, which was confirmed experimentally by Steinitz and Weigert in 1910. Czerny also introduced the idea of long pauses in feeding the baby, and has created an individual school of pediatric thought by leading physicians away from exclusive contemplation of the infantile intestine and its contents to the intermediary processes of metabolism.

Heinrich **Finkelstein** (1865–), of Leipzig, graduated in philosophy (1888) and medicine (1893) at Berlin, became assistant at the pediatric clinic in the Charité (1894), and is now professor in the University (1913), and is head physician to the Orphan Asylum and the Children's Asylum. In 1902, he published an essay on infantile diseases due to trauma, in 1904, with L. Ballin, a monograph on the nursling-foundlings of Berlin and their institutional care, in 1905–12 a two-volume treatise on diseases of nurslings, in 1906–10, a series of papers setting forth his theory of sugar and salt intoxication (alimentary fever)† with the introduction of albumin milk (*Eiweissmilch*), a mode of starvation feeding, which is employed until the intestinal disorder is relieved. Finkelstein's initial theory that sugars are harmful (1906) has been modified by him to the effect that fat is only

* Czerny and Keller, "Des Kindes Ernährung, Ernährungsstörungen und Ernährungstherapie." Leipzig and Wien (1906).

† Finkelstein, Verhandl. d. Gesellsch. f. Kinderheilk., Stuttgart, xxiii (1906), p. 117. Jahrb. f. Kinderheilk., lxv (1907), pp. 1, 263; lxviii (1908), p. 521; lxxi, (1910), p. 525.

harmful when the intestines are irritated by carbohydrate fermentation (1910). In 1911, appeared his *Arbeiten* from the Berlin Children's Asylum. Finkelstein, a man of broad philosophical education, is described as a keen, close observer and most remarkable clinician of the analytic type. Like several other eminent physicians, he early made his mark in geology (Abt).

Arthur **Schlossmann** (1867–), of Dresden, who was simultaneously director of the Pediatric Polyclinic and Infant's Home at Dresden, and, in 1906, became professor and director of the Children's Clinic at Düsseldorf, has written on rickets (1891), diphtheria (1894),

Fig. 38.—Heinrich Finkelstein (1865–). (Courtesy of Dr. Isaac A. Abt, Chicago.)

Fig. 39.—Arthur Schlossmann (1867–). (Courtesy of Dr. J. H. Hess, Chicago.)

the differences between human and cow's milk (1898), and the composition of human milk (1900–1902), poisons and tuberculosis (1906), the care of infants in the first two years of life (1907), and stall hygiene (1909). He did most for the organization of infant hygiene on a grand scale. In 1908, he showed that the saliva of the newborn converts starch into sugar as soon as secreted. With H. Murschhauser, he showed the marked influence of muscular activity on heat production in the attempt to ascertain the basal metabolism of the infant (1908–14);* and investigated the fasting metabolism of infants, showing the pathological appearance of acetone in the urine, after 18 hours fast, from the privation of food carbohydrates (1913). He collaborated with M. von Pfaundler in a pediatric *Handbuch*, on the co-operative plan

* Schlossmann and Murschhauser, Biochem. Ztschr., Berlin, xiv (1908), p. 369; xxvi (1910), p. 14; liii (1913), p. 265; lvi, p. 355; lviii (1914), p. 483.

(1906, 2d ed., 1910–12), which was translated into English under the editorship of Henry L. K. Shaw and Linnaeus E. La Fetra (1908, 2. ed., 1912). Schlossmann is co-editor of the *Archiv für Kinderheilkunde* (1902), and the *Zeitschrift für Säuglingsfürsorge* (1910).

Meinhard von **Pfaundler** (1872–) director of the University Pediatric Clinic at Munich, investigated the anatomy of the suprarenal glands (1892), the gastric capacity of infancy and childhood (1898), spinal puncture in children (1899), calcium absorption in rickets (1904,) and, with E. Moro, demonstrated that hemolysin is a normal constituent of different milks (1907.) He collaborated with Schlossmann in the above-mentioned *Handbuch der Kinderkrankheiten* (1906). His pediatric clinic at Munich is one of the best on the continent.

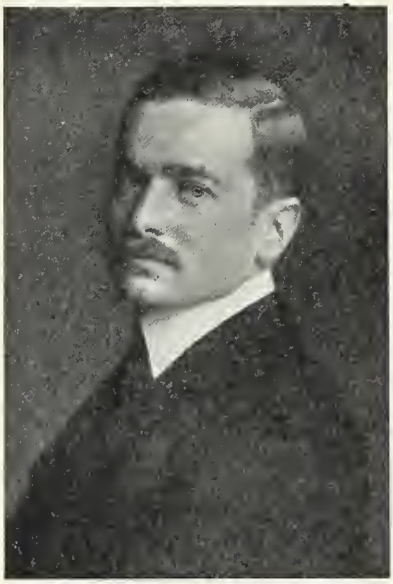

Fig. 40.—Meinhard von Pfaundler (1872–). (Courtesy of Dr. J. H. Hess, Chicago.)

Arthur **Keller** (1868–), Czerny's assistant, has written on the care of illegitimate infants (with H. Reicher, 1909), infant nutrition (1901), infant welfare and child-protection in England, Scotland and Hungary (1911) and collaborated with Czerny in his massive treatise on infant nutrition (1906). He showed that breast-fed infants retain more (or excrete less) phosphorus than the bottle-fed, which was confirmed by L. F. Meyer (1908) and by Knox and Tracy (1914). He also showed that carbohydrates make protein digestion more complete. In 1912, he edited (with Chr. J. Klumker), a collaborative history of infant welfare and child-protection in Europe by many hands.

Leo **Langstein,** private-docent in pediatrics at the University of Berlin, graduated at Leipzig with a dissertation on albuminuria in older children (1897) and collaborated with L. F. Meyer in a sterling work on infant nutrition and metabolism (1910),* the clearest, most compact and most intelligible of all modern books on this subject. He investigated erepsin in the fetus (with Soldin, 1908) and showed (with Steinitz) the presence of lactose in all stools of enteritis (1909).

Ludwig F. **Meyer,** Finkelstein's pupil and privat-docent at Berlin, collaborated with Langstein in the above mentioned work on infant nutrition (1910), showed the retention of nitrogen for tissue-building in fasting infants and as the amount of protein in food is increased

* Langstein and Mayer, "Säuglingsernährung und Säuglingsstoffwechsel." Wiesbaden (1910).

(1908), investigated infantile atrophy under different conditions and with different foods (1910) and showed that normal babies are able to digest fats, since there is no loss of fat or salts when fats in the food are increased (1910). Langstein and Meyer also did important work on alcaptonuria and the effect of sugar on infant nutrition.

Hermann **Brüning** (1874–), professor extraordinarius of pediatrics at Rostock, where he habilitated with a dissertation on infant nutrition (1906), is the author of a history of artificial nutrition of infants (1908), a study of infant mortality in Mecklenburg-Schwerin (1909), and edited with E. Schwalbe, a collaborative Handbook of the General Pathology and Pathological Anatomy of Childhood (1912).

Emil **Feer** (1864–), of Aarau, Switzerland, settled as pediatrist in Basel (1892), became professor extraordinarius and director of the Pediatric Clinic at Heidelberg (1907) and later professor of pediatrics and director of the University Pediatric Clinic at Zürich (1911). He wrote on the power of heredity (1905), diseases of the air-passages and respiratory organs in infancy (1906), the influence of consanguinity of the parents on the child (1907). In 1896, he showed that the nursling gets one-half its meal in the first five minutes of suckling and more than one-quarter in the next five minutes. In 1910, he published a concise and comprehensive *Lehrbuch der Kinderheilkunde*, containing contributions on infantile diseases and digestive disorders by Finkelstein, blood and diathetic diseases by Pfaundler, diseases of the air-passages and tuberculosis by Pirquet, diseases of the heart and infectious diseases by Feer, diseases of the genito-urinary organs by Tobler, diseases of the nervous system by Ibrahim, syphilis and cutaneous diseases by Moro. This became so popular that it reached its third edition in 1914.

Ludwig **Tobler** (1877–1915) of Zürich, graduated at Zürich (1902), became assistant in the pediatric clinic (1905) and professor extraordinarius (1911) at Heidelberg and later professor and director of the University Clinic at Breslau (1911). He investigated the axillary arch in man as a vestige of the mammalian panniculus carnosus (1902), studied the mechanism of gastric digestion (1905–6), the coagulation-time for casein in the stomach (1906), the duration of gastric digestion in infancy, using the *X*-ray (1908), and showed that fats delay the emptying of the stomach and that large amounts of fats cause pyloric spasm (1907). With Noll, he studied the calcium metabolism in infants (1910) and collaborated with Bessau in a work on the pathological physiology of nutrition and metabolism in children (1914).*

Yussuf **Ibrahim,** director of the Hamidié Hospital, founded by Sultan Abdul Hamid II at Constantinople in 1898, and latterly of the Gisela Children's Hospital at Munich, habilitated at Heidelberg with a dissertation on congenital stenosis (1905), wrote on rheumatism (1906) and nervous diseases (1911) in children, and in 1908 made an important contribution on the digestive ferments in the stomach, pancreas and

* Tobler and Bessau, "Allgemeine pathologische Physiologie der Ernährung und des Stoffwechsels im Kindesalter." Wiesbaden (1914).

intestines of the newborn infant.* He was the first to find enterokinase in the intestinal mucous membrane of the newborn (1908).

Franz von **Soxhlet** (1848–1907), of Brünn, Moravia, professor of agricultural chemistry in the Technical High-School at Munich, has written on the physical chemistry of milk (1872), the nature of milk droplets (1876), metabolism of the calf (1878), fat formation from carbohydrates (1882), the chemical differences between human and cow's milk (1893) and devised a method for estimating the fat-content of milk (1881) and the well-known method and apparatus for sterilizing infant's milk (1886).† Other valuable studies of milk have been made by C. O. Jensen (1903), Milton J. Rosenau (1908–12), K. Winslow (1909), Paul Sommerfeld (*Handbuch der Milchkunde*, 1909) and Janet E. Lane-Claypon (1912–13).

In France, Pierre-Constant **Budin** (1846–1907), of Paris, who succeeded Tarnier as professor of obstetrics on the Paris Faculty (1898), has written on the sterilization of milk (1892), on lying-in women and the newborn infant (1897), a *Manual pratique de l'allaitement* (1905, 2. ed., 1907), and a comprehensive treatise on the nursling (*Le Nourrisson*, 1900), which has been translated into English (1907), and is frequently drawn upon as a storehouse of interesting facts.

Henri de **Rothschild** (1872–), head physician of the Polyclinic H. de Rothschild and director of the *Revue d'hygiène et de pathologie infantile* (1902), has written on sterilized milk in infant nutrition (1897), the hygiene and protection of childhood in Europe (1897), gastro-intestinal troubles in infancy (1898, 1904), *L'allaitement mixte et l'allaitement artificial* (1898), the hygiene of milk feeding (1899), the milk-industry (1903–4), has prepared an exhaustive and valuable bibliography of milk (*Bibliotheca lactaria*, 1901–2), and has edited a massive and sumptuous treatise on the hygiene and pathology of infancy, by various authors (1905). Rothschild is a sportsman, playwright and philanthropist-physician, whose activities in securing milk-depots for the poor of Paris are comparable with those of Nathan Straus in New York (1890). He was one of the first to found a "Nursling's Consultation" or "Mother's Home" in Paris, which soon outgrew its modest home in the rue Picpus and, in December, 1902, acquired a splendid building in the rue Mercadet. In 1905 a brilliant banquet was given in his honor, at which his former teachers, Dieulafoy, Budin, Poirier, responded in terms of cordial praise.‡

Luigi **Concetti** (1854–1920), of Rome, a very active teacher, wrote much on pediatric instruction (1895–1911), and a treatise on infant hygiene (1903). Francesco **Fede** (1832–1913), editor of *La Pediatria* (1893), described the sublingual tumor (*produzione sottolinguale*) to which Riga of Naples drew attention in 1881 (Riga's disease).

* Ibrahim, Verhandl. d. Versamml. d. Gesellsch. f. Kinderheilk., deutsch. Naturf. u. Aerzte (1908), Wiesbaden, xxv (1909), pp. 21–42.

† Soxhlet: München med. Wochenschr., xxxiii (1886), pp. 253, 276.

‡ Hommage au Dr. Henri de Rothschild. Progrès méd., Paris, xxi (1905), 3. s., pp. 371–376.

In Russia, much work has been done on the physiology of infantile digestion in "The Peculiarities of Childhood" by N. P. Gundobin (1912) and the papers and students' theses of Glinsky (1895), Sotoff (1895), Wulfson (1898), Geptner (1900), Harge (1900) Debele (1901), Kovalski (1900), Snarsky (1901), Borisoff (1903), Heymann (1904), Sellheim (1904), and others (Morse and Talbot).

Thomas Morgan **Rotch** (1849–1914), of Philadelphia, a medical graduate of Harvard (1874), eventually held the first professorship of pediatrics in that University (1888). He did much to give pediatrics a definite place in the medical curriculum, established the Infant's

FIG. 41.—Thomas Morgan Rotch (1849–1914).

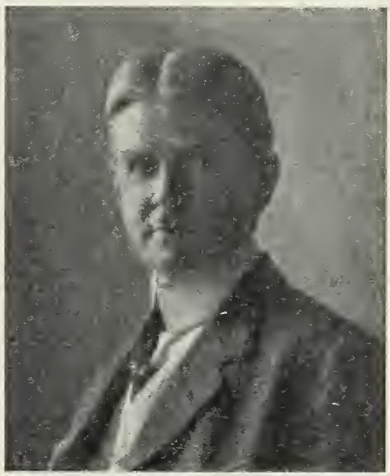

FIG. 42.—Luther Emmet Holt (1855–).

Hospital and the first milk laboratory (Walker-Gordon, 1891) in Boston, wrote an important pediatric treatise (1896) and was the pioneer of the clean milk idea in America. His Walker-Gordon laboratory was soon followed by similar aseptic establishments in London and elsewhere. He introduced the method of percentage or substitute feeding of infants (1896) in which fats, carbohydrates and sugar were given in dosage approximate to the needs of different babies. The doctrine of proteins, upon which the advocates of percentage feeding relied, was contravened by the purposeful *Eiweissmilch* of Finkelstein, which (as although nearly free from lactose) was again evolved from the equally dubious doctrine of the indigestibility of sugars. Rotch also did some important work on pericarditis and pericardial punctures; and, toward the end of his life, made some researches on the physiological age of children, using *X*-ray pictures of the small bones of the wrist as a basis for an anatomical index of growth in relation to the "somatic" as opposed to the "chronological" age of the child (1907–10).*

* For a good account of Rotch's work, see A. Jacobi, Am. Jour. Dis. Child., Chicago, viii (1914), pp. 245–249.

Luther Emmet **Holt** (1855), of Webster, N. Y., a graduate of the College of Physicians and Surgeons, New York, and professor of diseases of children in the New York Polyclinic (1890) and the College of Physicians and Surgeons (1902), is an acknowledged leader of pediatrics in this country, a strong executive and an able teacher and writer. He is the author of treatises on the Care and Feeding of Children (1894, 8th ed., 1915) and the Diseases of Infancy and Childhood (1896, 7th ed., 1916) and a large number of minor contributions. He has been a principal advocate of home modifications of milk and pasteurized milk. In the laboratory study of infant metabolism,

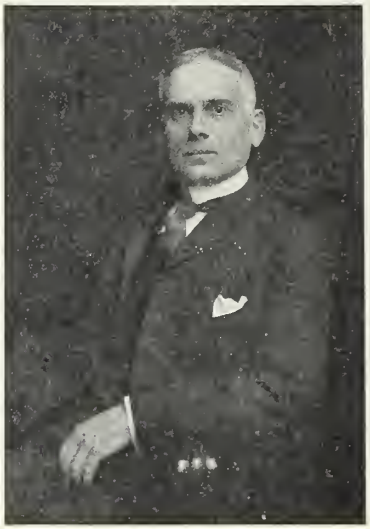

FIG. 43.—Henry Dwight Chapin (1857–).

FIG. 44.—Isaac Arthur Abt (1867–).

he has worked with P. A. Levene, Angela M. Courtney, D. D. Van Slyke and Helen L. Fales on the effect of high protein feeding (1912), casein feeding (1913), the chemical composition of diarrheal stools (1915), the excretion of magnesium sulphate (1915), human milk (1915) cod-liver oil in infantilism (1917) and fatty metabolism in infants (1919). Holt has also written a suggestive historical study of infant mortality (1913), and, with Miss Ellen C. Babbitt, a valuable statistical analysis of institutional mortality in the new-born, based upon 10,000 consecutive births(1915).

Henry Leber **Coit** (1854–1917), of Peapack, New Jersey, a graduate of the College of Physicians and Surgeons, New York (1883), was the originator of the certified milk movement in the United States, which he worked out in a dairy plant near Newark in the first instance. He also organized an infant's hospital at Newark.

Henry Dwight **Chapin** (1857–), of Steubenville, Ohio, a graduate of the College of Physicians and Surgeons, New York (1881), professor of pediatrics in the New York Post Graduate Medical School

and Hospital, was, with Jacobi, the principal advocate of standardized cereal gruels in infant feeding. He has studied the biological aspects of different milks, invented the Chapin milk-dipper, and is the author of a "Theory and Practice of Infant Feeding" (1902, 3d ed., 1909), Vital Questions (1909), and, with Godfrey Roger **Pisek** (1875–1921), of New York, a Treatise on Diseases of Children (1909, 4th ed., 1919). He has also written on the function of maternal milk in developing the stomach (1903), proteid incapacity in infant and child (1907), acidosis of intestinal origin (1916) and established the distinction between the gross caloric value of a food and its net caloric value, *i.e.*, the energy required for its digestion and assimilation (1913). Chapin has done much in humanitarium work for the homeless infants of the poor in New York City.

Isaac Arthur **Abt** (1867–), of Wilmington, Illinois, a graduate of the Johns Hopkins University (1889) and of the Chicago Medical College, Chicago (1891), was interne of Michael Reese Hospital (1891–3), did post-graduate work in Vienna and Berlin (1893–94), and has been professor of pediatrics in the Northwestern University, Woman's Medical School (1909), Rush Medical College and the Michael Reese, Cook County and other Chicago hospitals. As the leading pediatrist in the West, he is widely known as a teacher, writer and editor. He is the author of "The Baby's Food" (1917), and editor of the pediatric volumes in the Practical Medicine Series (1906–21).

He has made a large number of investigations, notably of floating kidneys in children (1901), acute non-suppurative encephalitis (1906), rachitic erosions of permanent teeth as a result of infantile diseases (with Mortimer Frank, 1908), status of the kindergarten (1908), irritating effects of cathartic drugs in infants (1909), traumatic diabetes (1911), "starch-injuries" (1913), unusual types of acid intoxication (1914), 226 cases of chorea (1916), familial icterus in newborn infants (1916). He has also written an interesting history of the classification of gastro-intestinal diseases (1912).

John **Howland** (1873–), of New York, a graduate of University Medical College, New York (1897), and professor of pediatrics in the Medical Schools of Washington University, St. Louis, (1911) and the Johns Hopkins University (1912), has been a pioneer in American work on the fundamental requirements of infant nutrition. In 1910–11, he studied the chemical and energy metabolism of sleeping children, substituting direct calorimetry for computations from heat-measurement, and in 1913, he devised a formula for estimating the area of body surface in connection with infant metabolism. He assisted Holt in the sixth and seventh editions of his pediatric treatise (1911, 1919,) and with his talented associate, William McKim **Marriott** (1885–), has made important studies on acidosis and acetone-body production in children's diseases (1916) and the calcium content of the blood in rachitis and tetany (1916). Marriott has devised methods for determining the alkali content of the blood plasm (1916) and the alveolar carbon dioxide (1916).

John Lovett **Morse** (1865–), of Taunton, Mass., a graduate of

Harvard (1887), and of Harvard Medical School (1891), practised in Boston (1892) and became instructor in pediatrics in Harvard Medical School (1903–6), assistant professor (1906–15) and professor (1915). An unsurpassed clinician, he has written a great number of papers from his large experience, culminating in his Case Histories in Pediatrics (1911, 2d ed., 1913), in which the subject is taught inductively by the

FIG. 45.—John Howland (1873–).

FIG. 46.—John Lovett Morse (1865–).

synthetic method. He is also the author of the Care and Feeding of Children (1914), and of studies on the overheating of food as a cause of scurvy (1906–14) and on casein dyspepsia (1913); and has collaborated with Fritz Talbot in the Diseases of Nutrition and Infant Feeding (1915, 2d ed., 1920), a book in which the history of the subject is deftly interwoven, with valuable footnotes, as in Schaefer's Physiology.

Fritz Bradley **Talbot** (1878–), of Boston, a graduate of Harvard (1900) and Harvard Medical School (1905), after clinical experience in the Children's Hospital, Boston (1905) and the Massachusetts General Hospital (1905–7), was Morse's assistant for three years, at the same time doing work in biological chemistry at Harvard. He is now instructor in pediatrics in the Harvard Medical School, was visiting physician to the Boston Floating Hospital (1909–14) and since 1909 has been chief of the Children's Medical Department at the Massachusetts General Hospital. Well-grounded in the best type of American training, Talbot has attacked some difficult problems. In 1909–10, he investigated the large and small curds in infants' stools, showing, by serologic methods, that the large bean shaped curds, originally examined by Biedert (1888), are composed of casein, the small soft curds, examined by Uffelmann (1881), Fr. Müller (1884), Escherich (1888),

being made of fatty acids or soaps. In 1912, he began his studies on the gaseous interchange and general metabolism of infants with Francis Gano **Benedict** (1870–), of Milwaukee, director of the Nutrition Laboratory of the Carnegie Institution of Washington, resulting in two monographs on the Gaseous Metabolism of Infants (1914) and the Physiology of the New-born Infant (1915). Talbot has also investigated the effect of lactose on nitrogen metabolism

FIG. 47.—Fritz Bradley Talbot (1878–).

FIG. 48.—John Ruhräh (1872–).

(with L. Hill, 1914), the energy metabolism of the decerebrate infant (1915) and the cretin (1916–18), the protein metabolism of infants (with J. L. Gamble, 1916), and the relation of asthma in children to anaphylaxis (1914–16). He collaborated with Morse in the book on infant nutrition above mentioned (1915, 2d ed., 1920).

John **Ruhräh** (1872–), of Chillicothe, Ohio, a graduate of the College of Physicians and Surgeons (Baltimore, 1894), did postgraduate work at the Johns Hopkins, the Pasteur Institute, Paris (1897) and in other European schools (1900–1901), was quarantine physician of the port of Baltimore (1898–1900), where he is now professor of pediatrics in the University of Maryland Medical School and in the College of Physicians and Surgeons. He made the first collective investigation of actinomycosis in the United States (1899–1900), introduced the soy bean in infant dietetics (1909), and is the author of a useful manual of the Diseases of Infants and Children (1905, 4th ed., 1914) with Julius Friedenwald, Diet in Health and Disease (1905, 5th ed., 1919) and Dietetics for Nurses (1905, 4th ed., 1917) and, with Erwin F. Mayer, a treatise on "Poliomyelitis in all its aspects" (1917). He has been active in medical library work, was instrumental in the erection of the new Library building of the Medical and Chirur-

gical Faculty of Maryland and is editor of the *Bulletin of the* Medical Library Association (1911).

Bert Raymond **Hoobler** (1872–), professor of pediatrics in the Detroit College of Medicine and Surgery, has done important work on the retention of mineral salts in infant metabolism (1911), the effect of protein diet on the product of human milk (1917), and is the deviser of an adjustable metabolism bed (1912) and a device for standardizing blood-pressure readings (1912). He also investigated the metabolism of ten hospital infants and devised a respiration incubator for the energy metabolism of infants (1915) with John R. **Murlin** (1874–), who has also studied the metabolism of development (1910) and the metabolism of mother and child just before and after birth (with Carpenter, 1911).

Alfred Fabian **Hess** (1875–), clinical professor of pediatrics in the University and Bellevue Hospital Medical College, devised a duodenal tube and catheter (1911–12) and investigated infantile jaundice (1912), allergy to common foods (1912), the leucocyte count in pneumonia and meningitis (1914), pylorospasm and allied spasm (1914), gastric exploration (1914–15), protective therapy for mumps (1915) and has recently made extended studies of infantile scurvy (1916–19), summarized in his treatise of 1920.

Julius Hays **Hess** (1876–), professor of pediatrics in the College of Medicine, University of Illinois, and chief of the pediatric staff at Cook County Hospital (Chicago) is the author of recent books on infant feeding (1918, 2nd ed. 1919) and on premature and congenitally diseased infants (1921).

Of other work in this field, it is sufficient to mention that done in the Russell Sage Institute of Pathology by Graham Lusk, Eugene F. Dubois, Delafield Dubois and Frank C. Gephart on clinical calorimetry (1915–16), the method of estimating fats devised by Gephart and F. A. Csonka (1914), the linear formula of Delafield Dubois for calculating the surface area of the body (1915), the investigations of E. F. Dubois on metabolism in boy-scouts (1915–16), the survey of Lucy H. Gillett on evidence regarding food allowances for healthy children (1910) and of Gillett and Sherman on Adequacy and Economy of Some City Dietaries (1917).

Bacteriology and Serology

The work of Pasteur, Koch and Lister brought about some striking improvements in practical pediatrics. The studies of the great Viennese pediatrists, Bednar and Ritter von Rittershain, upon the intestinal toxemias and wound-infections of infancy were carried forward into direct prophylaxis by Epstein, who instituted the most rigid aseptic procedure, an absolute surgical cleanliness, in the hygienic management of the wards in foundling asylums and their inmates, lowering the mortality, during 14 years, from 30 to 5 per cent. Prior to this period, Gottfried **Eisenmann** had suggested the instillation of chlorine water to prevent infantile conjunctivitis (1830), which was neglected until the obstetrician, C. S. F. **Credé** (1819–61) introduced his silver nitrate solution (1884). Ignaz Philipp **Semmelweis** (1818–65) made himself immortal by his precautionary measures against puer-

peral septicemia (1847–61), which was followed by the carbolic acid solution of Étienne **Tarnier** (1881). Pediatrists trained in technical chemistry, like Schlossmann, took up the hygiene of stalls and of milk and the milk-supply, so that infant life was truly surrounded, in hospital at least, by every aseptic precaution. In 1886* Theodor **Escherich** (1857–1911)† of Munich, a pupil of Gerhardt, professor at Graz (1890, 1894) and Vienna (1902), where he succeeded Widerhofer, published the first treatise on the intestinal bacteria of infants, a classic work which is still a monument of research. It was based upon his new method of isolating bacteria in infantile feces (1884). The infant's mouth (sterile at birth) is infected by the bacteria from the mother's vagina during labor, and from the air, nipples, milk and other foods after birth. Escherich described the swarming bacterial flora of the intestines and gave the first account of bacillus coli infection. Other bacteria, such as the Bacillus bifidus of Tissier, the bacillus acidophilus of Moro, the Welch bacillus and the peptonizing bacillus of Rodella have since been found. Noguchi has changed the bacillus bifidus into b. acidophilus and back again (1910), and while it has been difficult to prove pathogenicity of the infantile strains in laboratory cultures, Escherich, in 1900, described an epidemic of severe diarrhea (*blaue Bacillose*) from the normal acidophilic flora of the infantile intestine, which, in the view of Moro (1905), demonstrates the possibility of endogenous infection. In 1900, Escherich advanced the hypothesis that the bacterial changes in the intestine, exogamous or endogamous, may set up a mild intoxication or "chymus infection," an afebrile, acid mucous diarrhea (the ordinary banal gastro-enteritis), which may be followed by a secondary infectious, toxic gastro-enteritis, the equivalent of the various dyspepsias and intestinal catarrhs of the past. In 1889, he tabulated the nutritive requirements of infants by age. In 1902, he maintained that sugar is harmful to the infant as being a culture-medium for the growth of pathogenic bacteria of the intestines.‡ In 1892, Paul **Ehrlich** (1854–1915) showed that immunity is transmitted to the infant through the maternal milk; that artificial immunity can only be acquired through the milk, and that immunity

Fig. 49.—Theodor Escherich (1857–1911). (Courtesy of Dr. J. H. Hess, Chicago.)

* Escherich, "Die Darmbakterien des Säuglings." Stuttgart (1886).

† For biography of Escherich, see Finkelstein, Deutsche med. Wochenschr., Leipzig and Berlin, xxxvii (1911), p. 604; Pfaundler, München med. Wochenschr., lvii (1911), pp. 521–523; von Pirquet, Ztschr. f. Kinderheilk., Berlin, i (1910–11), pp. 423–441 (with bibliography).

‡ Escherich, Deutsche Klinik, Berlin, vii (1902), p. 126.

may be transmitted by milk of the same species but not by milk of another species. Jules **Bordet,** in 1899, showed that injection of cow's milk into other animals produces a precipitin in the blood for the albuminous bodies of cow's milk, which it coagulates. August von **Wassermann** (1866–) showed that the proteins of different animals are different, *i.e.,* that the blood serum of animals sensitized to cow's, human or other milks will precipitate that particular milk and no other (1900). Clemens von **Pirquet** (1874–), former professor of pediatrics in the Johns Hopkins University and at Breslau (1900),

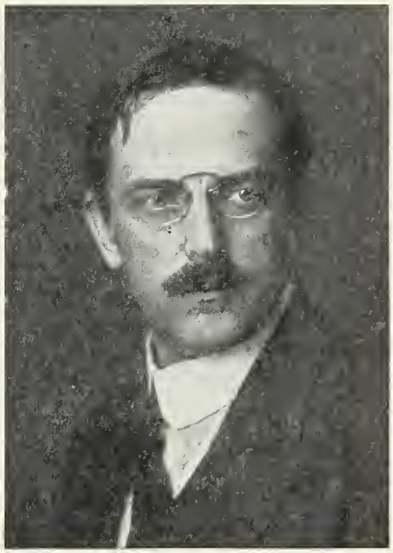

FIG. 50.—Clemens von Pirquet (1874–).

FIG. 51.—Julius Parker Sedgwick (1876–).

and director of the University Pediatric Clinic at Vienna (1911) introduced the cutaneous reaction to tuberculin (1907), which is of great use in the diagnosis of infantile tuberculosis; developed the doctrine of allergy (1907–11) and "serum disease" (1905–7); and the doctrine of feeding by nems (energy in 1 cc. of milk), estimated by a height : weight ratio, in place of calories (1917). In this connection the formula of George Dreyer for the relation of vital capacity to body weight and surface (1919) is important. Pirquet's assistant, B. Schick, discovered the cutaneous reaction for estimating the extent of antitoxin producing power in the blood (1910). Ernst **Moro** demonstrated the presence of an amylolytic ferment in the pancreas of the newborn (1898), showed the rapid increase in starch-digesting power in the first week of life (1898), showed that the blood of breast-fed infants is more bactericidal than that of the bottle-fed, maintained the doctrine of endogenous infection from the normal bacterial flora of the infantile intestine (1905–7), introduced the skin reaction with tuberculin (1908) and a specific reaction for human and cow's milk (1912).

William David **Booker** (1844), of Virginia, clinical professor of pediatrics in the Johns Hopkins University (1897), investigated the bacteriology and pathology of the summer diarrheas of infants in 1888–96.

Oscar Menderson **Schloss** (1882–) of Cincinnati, professor of pediatrics in the Medical Department, Harvard University, has done some remarkable work on the relation of the metabolism of nitrogen, phosphorus and the purin substances to uric acid infarcts in the kidney (1911–16), on protein sensitization to eggs and other food products (1915), and the permeability of the gastro-enteric tract of infants to undigested protein (1916). Julius Parker **Sedgwick** (1876–), of Wrightstown, Wisconsin, a graduate of Rush Medical College, Chicago (1899) and, professor of pediatrics in the University of Minnesota (Minneapolis) discovered a fat-splitting ferment in the stomach contents of the newborn infant (1906),* has investigated recurrent vomiting (1912), spasmophilia in children (1912–16), oxalic acid excretion in the urine of children (1915), the uric acid content of the blood in the newborn (1917) and has shown (with W. P. Larson) that the complement-fixation test with the bacillus abortus is present in the blood of women who have aborted and in the blood of many children (1913–15).† William Palmer **Lucas** (1882–), professor of pediatrics in the University of California Medical School, San Francisco, has studied the cytology of meningitis (1911), rheumatic endocarditis in infants (1914), the blood picture in the diagnosis of measles (1914) and has made a special study of the delinquent child. David Murray **Cowie** (1872–), professor of pediatrics in the University of Michigan Medical School (Ann Arbor) has studied the serum disease (1914) and the intradermal reaction to diphtheritic antitoxin (1916); and Borden Smith **Veeder** (1883–), associate professor of pediatrics in the Washington University Medical School (St. Louis) has investigated the metabolism of infants (with C. A. Fife, 1911), the bacteriology of the intestinal diseases of infancy (1912) and, with M. R. Johnston, the frequency of infection with the tubercle bacillus (1915), the chemistry of urine (1916) and the creatin and creatinin content of the blood (1916).

Kenneth Daniel **Blackfan** (1883–) has investigated the skin reaction from proteins in eczema (1916), and, with Walter E. Dandy, the pathology of internal hydrocephalus (1914–17). Mathias **Nicoll**, Jr., professor of infectious diseases in the University and Bellevue Hospital Medical College, New York, has done good work on scarlatina (1911) and poliomyelitis (1917) in children, and (with Josephine Pratt) on the infectivity of the bacillus abortus in man (1915).† Henry Fred **Helmholz** (1882–) pediatrician at the Mayo Foundation, Rochester, Minnesota, has investigated hippuric acid in infants' urine (with S. Amberg, 1913) the infectious nature of duodenal ulcer (with L. Gerdine, 1915) and the bacteriology of the urine (with C. Beeler, 1916). In Jacobi's clinic in the German

* Sedgwick, Jahrb. f. Kinderheilk., lxiv (1906), p. 194. Arch. Pediat., xxiii (1906), pp. 414–425.

† Larson and Sedgwick, Am. Jour. Dis. Child., Chicago, vi (1913), p. 326; x (1915), p. 197.

‡ Nicoll and Pratt. *Ibid.*, x (1915), 203–205.

Hospital, New York, an auto-serum treatment for chorea has been tried out by Abraham L. Goodman (1916).

INFANT MORTALITY AND INFANT WELFARE

"De tout temps, l'absence de la mère et la privation du sein et des soins maternels ont été le grand danger et la principale cause de la mort de l'enfant au berceau." Théophile Roussel.

Toward the end of the eighteenth century, the subject of infant mortality and its causes, shamefully neglected in preceding ages, began to engage the attention of observing physicians. In a Swedish royal decree of 1748, the attention of the state authorities is directed to the high infant mortality existing in Stockholm and elsewhere, and one of the causes assigned for it is the lack of proper medical care of the poor.* In 1773, we find a dissertation of Verardo Zeviani, at Verona, *Delle numerose morte dei bambini.* An inquiry into the causes and the best preventive measures, by J. Ballexserd, of Geneva, follows in 1775. This is translated into German (1776), and followed by eight contributions of other writers (in Meissner's lists). In the early nineteenth century, we find Meyer Abrahamson (1806), John Clarke (1815), John Bunnell Davis (1817), John Robertson (1827), Wilhelm Rau (1836), Oertel (1838), and many others writing upon this theme. In his Commentaries (1815), John Clarke judges of infant mortality from the burial records:

"Nearly a fourth die under two years of age, and, of the survivors, about a fifth in the succeeding eight years, that is under ten years of age . . . More than a third of all the burials are of children under two years of age."

These are generalizations from the older "bills of mortality" established by Henry VIII (1538). The appalling rates of infant mortality in eighteenth century England, Ireland and France have already been given. Underwood saw clearly that "The destruction of infants is eventually the destruction of adults, of population, wealth and everything that can prove useful to society or add to the grandeur of a kingdom." Queen Anne lost all her eighteen or nineteen children, and Gibbon, the sole survivor of seven children, regarded the death of a newborn child as, "an unnatural, but strictly a probable event" (Holt). The mathematician D'Alembert lived to disown his unnatural mother, who had abandoned him in the streets, and to tell her that the poor glazer's wife, who had brought him up to manhood, was his real mother. In the "Cursory Inquiry" (1817) of John Bunnell Davis, whom Holt regards as the most prominent pioneer in keen thought upon infant mortality,† the conditions associated with mercenary

* Medin, O., Jahrb. f. Kinderheilk., Berlin, lxxiv (1911), p. 490.

† Holt, L. E., Proc. Am. Assoc. Study & Prev. Inf. Mortal. (1913), p. 33. For a full account of infant mortality and infant welfare activities in Europe, see Säuglingsfürsorge und Kinderschutz in den europäischen Staaten, hrsg. von Arthur Keller und Chr. J. Klumker, Berlin (1912). For American developments see Philip Van Ingen in A Half Century of Public Health (Ravenel) New York, 1921, 290–322.

wet-nursing are clearly recognized as the cause of most infants' deaths, maternal nursing as their best safeguard. Davis founded the only English public dispensary for children in his day, and had a remarkable prevision of modern social service in his idea of visitations by benevolent ladies among the poor for the purpose of looking after sick children and instructing ignorant mothers in the art of properly caring for their infants. Prior to Davis, Richard Watt (1813) investigated the relative mortality from children's diseases in 1783–1812, and concluded that "more than half of the human species died before they were ten years of age and of this half more than a third died of smallpox," which he assumed to be replaced by measles and other infections.* Although the introduction of vaccination brought about some temporary lowering of infant mortality in the Napoleonic period, this good result was soon nullified by certain realignments in the modern social order of things. The French and American Revolutions brought on social democracy and industrialism. The vast improvements in mechanical arts and machinery, with the rapid movement of the rural population to cities as a consequence, created a huge manufacturing class, which was in turn absorbed by a grasping capitalistic régime with a numerous industrial proletariat as its vassals. The skilled artisan of the past was ruined by the large manufacturer, who, later on, was destined to be devoured by the capitalist. The need for cheap labor brought thousands of women into workshops and other fields of activity. As a reaction from the misery and ennui of lonely life on the farm or in the squalor of slums and tenements, and in consequence of the increased cost of living in cities, there was a great increase of prostitution and, therefore, of venereal disease. These factors influenced infant mortality in three ways: 1. Work away from home in factories caused mothers to neglect their children, who were thus exposed to the dangers of hand-feeding or of mercenary wet-nursing. 2. Factory life, under unsanitary conditions, told severely upon the health of the mother and consequently upon the child. 3. Exposure to venereal infection either destroyed the child itself or ruined its health at the start. In William Farr's data of infant mortality in 1860–61 cited by Holt,† the number of deaths per 1000 registered births was: Sweden, 141; Scotland, 149; England, 170; France, 223. In other words, infant mortality was lowest in the cold, bracing climates of Scotland and Sweden, where poverty and a hardy mode of life made it natural and necessary for mothers to nurse their own children; higher in England, where manufacturing interests brought about hand-feeding; highest in France, where the evils of mercenary wet-nursing and baby-farming were everywhere rampant. "In one province of Finland, where the mortality was excessive, investigation showed a great lack of maternal nursing" (Holt). Wartime statistics show that when women lose

* See the "Historic Note" of A. K. Chalmers in National Health Insurance Medical Research Committee, "The Mortalities of Birth, Infancy and Childhood." London (1917), p. 10 *et seq.*

† Holt, *op. cit.*, p. 35.

employment through depression of business, the infant mortality rate inevitably falls, even though the general death rate (as during the siege of Paris) is doubled, for the simple reason that mothers out of employment are driven back to breast feeding because they cannot afford to purchase milk for hand feeding. Holt emphasizes the benign effect of the sheer cheapness of breast feeding in this relation and among the poorer classes generally. In the present European war, increased employment of women in the munition factories increased the rate of infant mortality in France (Budin), but not in England. In 1859–61, Sir John Simon and others showed that the infant mortality curve rises in direct proportion to the extent of maternal employment. As shown in Rousseau's *Émile*, this is equally true of the allurements of the *beau monde*, politics, women's clubs and other feminist activities. "*Joie de rue, douleur du maison.*" So far as infant welfare is concerned, the *mater togata* becomes a home-breaker rather than a home-maker. The infant has a much better chance of surviving in rural or suburban districts than in the crowded cities, but as John Burns says, town life is not necessarily bad, "given good mothering, good food and plenty of it." Ashby* shows that infant mortality in the crowded Jewish quarters of towns is always low, in spite of overcrowding, defective housing and poverty, because the Jewish people set a great deal of store by home life and affection for children is strong among them. Infant mortality is very low in rural Ireland where maternal love is strong through the attractive human side of the women, and where poverty induces breast feeding. It is also low in some parts of rural England. During 1730–79, as Edmonds showed, the London mortality rate under 5 years was 66.2 per cent., during 1780–1829 only 37.7, while in 1911–15, it had fallen to 16.8 (Chalmers). About 1870, there began to be a uniform decline in infant mortality, for reasons given below, but there was no general fall until 1900, as shown by the following tables of five-year mortality in different countries (cited by Holt):†

	England	Ireland	Scotland	France	Germany	Italy	Belgium	Norway	Sweden
1881–5	129	94	117	167	207	175	156	99	116
1886–90	145	95	121	166	208	175	163	96	105
1891–5	151	102	126	171	205	185	164	98	103
1896–1900	156	106	129	159	201	168	158	96	101
1901–5	138	98	120	139	190	168	148	81	92

The infantile mortality rate per 1000 for England and Wales during 1900–1921 was 154 (1900), 151 (1901), 133 (1902), 132 (1903), 145 (1904), 128 (1905), 133 (1906), 118 (1907), 121 (1908), 109 (1909), 105 (1910), 130 (1911), 95 (1912), 108 (1913), 105 (1914), 110 (1915), 91 (1916), 96 (1917), 97 (1918), 89 (1919), 80 (1920), 83 (1921). A

* T. Ashby, Hugh, "Infant Mortality." Cambridge (1915), pp. 25–26.
† Holt, *op. cit.*, p. 38, footnote.

sudden ascent of the curve in 1904, 1906, and 1911 is attributable to unusually dry, hot summers, or other conditions inimical to infant welfare, but a laudable decline in the rate is noticeable. The causes of this decline since 1870 and particularly since 1900 are simple. After the introduction of Listerism (1869-70), surgical cleanliness became more and more popular, and to some extent affected milk and stall hygiene. In the same period, the causes of infant mortality, especially from diarrhea were carefully studied, and medical officers of health generally attempted to remove the conditions favoring it. From 1900 onward, the movement for infant welfare, a sort of twentieth century science, because well established. The infant welfare movement is mainly of French origin. Along with the decline of pediatrics as a specialty in England and France there has grown up an extension of social or preventive pediatrics, which is one of the brightest phases of modern medicine. This has been due to the fine humanitarian spirit of certain French and English writers and publicists and to the brilliant modern group of talented English public health officers, whose labors have more than set off the curious disinclination of the English physician to practise pediatrics in and for itself. On November 14, 1884, Firmin **Marbeau** (1798–1875), mayor of the first arrondissement of Paris, founded the first *créche* or day-nursery, where working mothers could leave their infants in willow cradles, usually in charge of a nun, with two attendants to rock the cradles. Nine other créches were founded in Paris during 1844–47. In 1847, a *Société des crèches* was formed, and the idea spread from France to Austria, Italy and Germany. There are now crèches all over Europe, usually supported by private benevolence. The principal service of crèches, according to Holt, has been to arouse the interest of the public in regard to infant welfare and the needs of working mothers. In 1862, Victor Hugo published his great epic of the misery of the poor (*Les Misérables*) and in 1869, another brief for child protection (*L'homme qui rit*). If it be true, as Schiller says, that "the brave man thinks of himself last of all," there can be no more poignant moment in literature than the feeling of the long-imprisoned Jean Valjean that the children confided to his care will have disappeared from life and that he will never see them again. In the beautiful episode of Cosette, the evils of baby-farming are laid bare, and Jean Valjean attains to his full spiritual stature through his friendship for a forlorn little child. These tokens of an enlarged interest in friendless children, preceded in England by Oliver Twist (1837–38), Nicholas Nickleby (1838–39), Old Curiosity Shop (1841), A Christmas Carol (1841), and David Copperfield (1850), were not without their sequel. Sir Robert Peel's Factory Health and Morals Act of 1802 for the preservation of the health and morals of apprentices and employees in cotton mills had little effect upon the terrible hardships endured by English factory children since the eighteenth century. In the vigorous humanitarian agitation against child labor which followed, it was shown that children bound to apprenticeship were, on occasion,

actually sold into slavery with the effects of a bankrupt, or transferred from one hard-hearted, tight-fisted taskmaster to another; that "cruelties the most heart-rending were practised upon the unoffending and friendless creatures who were thus consigned to the charge of master manufacturers; that they were harassed to the brink of death by excess of labor, that they were flogged, fettered and tortured in the most exquisite refinement of cruelty; that they were in many cases, starved to the bone while flogged to their work; and that even, in some instances, they were driven to commit suicide."* It took all the spirited zeal of Robert Owen (1812–29), all the passionate eloquence of Richard Oastler (1829–33) and M. T. Sadler (1829–35), all the able pamphleteering of William Cobbett and John Fielden (1836), all the tact and dignity of Peel and Lord Ashley to finally reduce the number of working hours and alleviate the condition of these unfortunates, through the Factory Acts of 1819, 1833, 1844, 1864, 1867, 1874, 1878, and subsequently. Infant mortality was vigorously discussed at the Dublin meeting of the National Society for the Promotion of Social Science (1861), at the Philadelphia meeting of the Social Science Association (1871), at the International Congresses of Hygiene at Brussels (1876), Paris (1878), and later. In 1865, the *Société protectrice de l'enfance* was organized in France and in 1876, the Society for Nursing Mothers (*Société d'allaitement maternel*). In 1872, the English "Life Protection Act" was passed requiring registration, licensing and inspection of all places where infants were farmed out away from their parents. In 1874, came the famous *loi Roussel*, for the protection of infants sent into the provinces from Paris for wet-nursing. This law required government inspection of all places where infants under two years were farmed out, nursing rooms and *crèches* for all nursing mothers working in factories and inspection of the same. About 20,000 infants had been sent out in this way, with a subsequent mortality of 75 per cent. The author of this splendid piece of progressive legislation was a physician, Théophile Roussel, the most eminent of medical statesmen, and a forerunner of the time predicted by Jacques Loeb, when scientific men will have a voice in legislative assemblies.

Théophile **Roussel** (1816–1903), the son of a country doctor in the department of Lozère, graduated in medicine at the Paris Faculty with a dissertation on pellagra (1845), a subject which he subsequently handled in two large treatises (1845, 1866), made valuable researches on the hygiene of workers in match factories (1847), the mercury miners at Almaden (1847–49) and other occupations, and wrote a life of Pope Urban V (1841), a manual of match fabrication (1847), a *Concours* on the value of physical signs in heart disease (1847) and studies on correctional and preventive education (1879). In 1845, he went into politics and was elected to represent his native department of Lozère (1849). Being a republican, he gave up his seat after the *coup*

* Fielden, John, "The Curse of the Factory System." London (1836), p. 10, cited by R. W. C. Taylor in "The Modern Factory System." London (1891), p. 189.

d'état (1851) and did not seek election until after the events of 1870–71, when he became deputy from the arrondissement of Florac (1876) and senator in 1879. In 1872, he took the initiative in a law for suppressing public drunkenness, which was followed by the three crowning achievements of his life, the laws of December 23, 1874, for the protection of infants sent out to nurse (*loi Roussel*),* of July 25, 1889, for the protection of morally abandoned or maltreated children, and of July 17, 1893, for the organization of medical charity. He was honorary president of the *Société protectrice de l'enfance* in 1893. On December 20, 1896, a touching jubilee was held in his honor at the Sorbonne. Disclaiming any credit for himself, Roussel said, with charming simplicity: "*C'est la fête de Protection de l'Enfance.*" Modest to a fault, he demanded that no eulogies be pronounced at his funeral, but an inspector general returning from his native Lozère said: "That is a land where there are no orphans, for those who have lost their parents have *le père Roussel* to take care of them." The ruling principle of Roussel's life was to translate charitable sentiment into enacted law. Through his persuasive eloquence and his personal charm, he came to be known as "the advocate of abandoned children."†

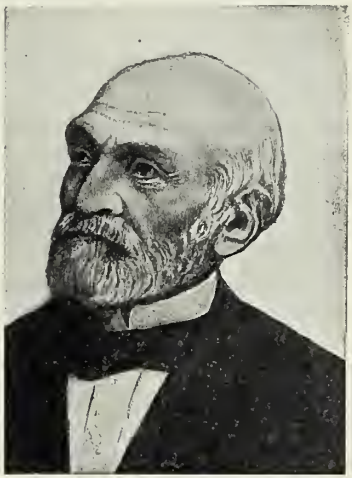

FIG. 52.—Théophile Roussel (1816–1903).

Following the *loi Roussel* came a long series of laws for the protection of maternity, forbidding the employment of women in factories for a statutory period before and after confinement. The initiative was taken by Switzerland in a law of 1877, requiring a rest of two weeks before and six weeks after the birth of the child, the pre-natal period being lengthened by a law of 1897. This example was followed by Hungary (1884), Austria (1885), Holland (1889), Belgium (1889), England (1891), Germany (1891), Portugal (1891), Norway (1892), Spain (1900), Sweden (1901) and Denmark (1901) (Holt). The first consultation for nurslings (*consultation des nourrissons*), an adjunct to maternity hospitals at which infants are regularly weighed and examined and mothers instructed in infant nutrition and hygiene, was organized by Pierre Budin at Paris in 1892. In 1893, Variot began to distribute milk at the Dispensaire de Belleville (Paris). The first milk

* For the text of the *loi Roussel* and subsequent infant welfare legislation in France, see Säuglingsfürsorge und Kinderschutz in den europäischen Staaten (Keller and Klumpke), Berlin (1912), pp. 1266–1325.

† For an extended account of the career of Roussel, see F. Houssay, Gaz. méd de Paris, iv (1904), 12 s., pp. 169, 181, 217, 229.

depot (*goutte de lait*) was established at Fécamp by Dufour in July, 1894, with the object not merely of distributing clean milk to indigent mothers, but of encouraging breast-nursing in every way. Holt lists the following national and international conferences on infant welfare:

"The National Congress for Infancy at Florence in 1896; the League against Infant Mortality, Paris, in 1902; the International Congress of Milk Depots, in Paris, in 1905; the National Conference on Infant Mortality, in London, in 1906; the International Union for the Protection of Child Life, in Brussels, in 1907; a large exhibit in Berlin in 1908, portraying the problem of infant mortality in all its phases; a second National Conference on Infant Mortality, in London, in 1908; the German Society for the Protection of Infants, in Munich, in 1909; the American Association for Study and Prevention of Infant Mortality, organized at New Haven in 1909; the Third International Congress for the Protection of Infant Life, in Berlin, in 1911; the English-speaking Conference on Infant Mortality, in London, in 1913."*

For the widespread awakening of interest in infant mortality, as indicated by these foregatherings, Holt assigns three causes, *viz.*, the growth and extension of the humanitarian spirit, the concern of modern states about depopulation, and the great advances made in preventive medicine during the last thirty years. It is not without reason that France has been the pioneer and principal advocate of infant welfare activities, for the steady falling in the French birth rate could only spell national and racial extinction in the end. And from France came the most impressive lesson in the science of attacking the problem of infant mortality at its source. During the ten years 1893–1903, the infant mortality of Villiers-le-Duc, a small village in the Côte d'Or of France, was known to be a stable zero. This came about in the following way. During the period 1804–54, the rate of infant mortality in Villiers-le-Duc fluctuated between 30 and 20 per 100. During the period 1854–63, however, it fell to a steady 15 per 100. This was due to the fact that the mayor of the little commune, M. Morel de Villiers, was interested in hygienic problems, and applied certain rational principles to the welfare of the babies in his district. After his death (1886), his two successors took no interest in these matters and the infant mortality rate immediately went up to 30 again. In 1884, his son, **M. Morel de Villiers,** an ex-army officer, became mayor, and applied his father's methods to such good purpose that the mortality rate immediately fell to 15.4 per 100 during 1884–93, and to zero during 1893–1903. In the meantime, M. Morel had studied and graduated in medicine.

The methods of the father were, in brief, the insurance of every woman with child, married or unmarried, at the expense of the mayoralty by the declaration of pregnancy before the seventh month; the assurance of free medical aid out of a village fund in all cases adjudged dangerous by the midwife; a grant of $0.20 *per diem* out of the same fund to every woman remaining in bed six days after her confinement; compulsory sterilization of milk, with appropriate apparatus, by all mothers or wet-nurses unable to nurse their infants at the breast; the systematic weighing of newborn infants every fortnight on a communal weighing machine, as a check upon the infant's condition; the compulsory notification of any illness in the

* Holt, *op. cit.*, p. 43

infant within 24 hours after its appearance; the withdrawal of qualification certifications from all wet-nurses not complying with these regulations, and the award of a bonus of $0.50 to any nursing woman who could produce a one-year-old child in good health as a result of her nursing during the period paid for.

These admirable provisions,* which contain all the essentials of recent infant welfare activities and which were printed as a definite municipal ordinance by M. Morel de Villiers on May 11, 1903, attracted the attention of Benjamin **Broadbent,** who became mayor of the county borough of Huddersfield, England, in order that he might get some definite action on the infant mortality problem. Later, Dr. Samson G. H. **Moore,** medical officer of health of the same community, took up the question. During 1892–1902, the rate of infant mortality in Huddersfield was 148 per 1,000 and in 1902 it was 138 per 1,000. In 1901, it was 132, as against 182 in Northumberland, 179 in Durham and Lancashire, 91 in Wiltshire and 95 in Rutlandshire and Westmoreland. During 1902–4 Dr. Moore made a careful analysis of infant mortality in Huddersfield, in the light of Morel's findings, and his admirable report of 1904, showing that nearly half of the babies had died from preventable causes, is now exhausted in its fourth edition.† In November, 1905, Mr. Benjamin Broadbent was elected mayor of Huddersfield, and on November 10, in his mayoral address, he announced that, at the birth of every child born in Huddersfield during his term of office, he would issue a promissory note of £1, payable to that child on its first birthday, if it lived through that period. This announcement attracted wide attention to the cause of infant welfare in the medical and newspaper press. In the meantime, as a result of Dr. Moore's report, final approval had been obtained from the sanitary authority (April, 1905) of a plan for "voluntary notification of birth to the medical officer of Huddersfield and the visitation in their homes of all newly born infants, immediately after birth, by women doctors, followed by voluntary workers," in order to instruct the mother as to the proper mode of nursing and caring for her offspring. Prior to 1906, the English law of 1837 required registration of births at any time within 42 days after birth. This arrangement delayed registration over six weeks. In 1906, the Borough of Huddersfield obtained parliamentary powers requiring notification of all births of the medical officer of health within 48 hours after birth. In the following year, Parliament passed an adoptive Notification of Births Act (1907), requiring notification of birth in addition to registration, by the father or other responsible person, to the medical officer of health within 36 hours after birth, under penalty of a fine of 20s. In 1915, this Act was supplemented by the Notification of Births (Extension) Act, extending the 1907 Act to areas in which it had not been adopted, and vesting any local authority with the powers of a sanitary

* For the text of which, see Moore, S. G. H., Lancet, London, i (1916), p. 944. Also Broadbent, To the Mothers of Huddersfield: An Open Letter, Huddersfield (n.d.), pp. 7–10.

† Moore, S. G. H., County Borough of Huddersfield. Report on Infant Mortality. 4 ed., Huddersfield (1907, *vel subseq.*).

authority, under the Public Health Acts of 1875–1907 or the Public Health (London) Act, 1901, for the purpose of promoting the care of expectant mothers, nursing mothers and young children. In other words, the properly authorized local authority is empowered to follow up all maternity cases to promote the welfare of mother and child and the Local Government Board has latterly agreed to defray half the cost of carrying out any plan for maternal and child welfare approved by the Board. In 1907, the infant welfare movement in Huddersfield came into full operation. The infant mortality rate fell from 134 per 1,000 in 1906 to 97 in 1907, the locus of infant mortality remaining at about that level subsequently. There were similar activities in other parts of England, contemporaneous with those at Huddersfield. In 1906 Dr. Archibald K. **Chalmers,** medical officer of health of Glasgow, made a study of infant mortality in the Scotch towns.* He found every movement of the infant mortality curve "an exaggeration," always higher in Scotland than in England, although the general death rate of England is higher than that of Scotland, and "invariably lowest in Ireland." The low rate of the insular rural districts corresponded with that of the residential suburbs of the large cities, and the chief increase was noticeable in the small towns and rural inland districts, rather than the large manufacturing centers. In Glasgow, the total rate was lowered by 15 per cent., representing a decrease of 30 per cent. in the proportion of deaths during the sixth to the twelfth months, and 16 per cent. in the third to the sixth months, while the rate during the first three months remained practically stable. The deaths in these three months were found not to be due to disease in the ordinary sense, but to defective vitality, syphilis, alcoholism, parental cell deterioration and other ante-natal causes. The hereditary diseases threatening the newborn infant are of the kind which, in Chalmers' phrase, "*strike vertically,*" while the ordinary intercurrent diseases of the after-period have a lateral or casual incidence. This important point was sensed by Karl Pearson when he found it impossible to fit the actual curve of infant mortality into his theoretical curve without taking into account the whole range of pre-natal influences.† Thus, given the

Fig. 53.—Sir Arthur Newsholme.

* Chalmers, A. K., Pub. Health, London, xviii (1905–6), pp. 409–438.

† "Pearson, Karl, The Chances of Death." London, i (1897), pp. 24–39. For a statistical examination of the ante-natal causes of infant mortality, see Fulton (J. S.), Tr. Am. Assoc. Study and Prev. Inf. Mortality, Baltimore, i (1910). pp. 115–152.

stationary character of the death rate during the first three months of life, vitality is "a quality of the child at birth rather than the accident of its surroundings afterwards" (Chalmers). In the important reports rendered to the Local Government Board by its medical officer, Sir Arthur Newsholme (1910),* it is shown that "excessive mortality in infancy implies excessive mortality in later life, that there is no essential causal relation between a high birth rate and a high rate of infant mortality," but that "a high infant mortality implies a high prevalence of the conditions which determine national inferiority"; that poverty connotes a high infant death rate, although breast-feeding is commoner among the poor than the rich; that early motherhood exerts a slight effect upon high infantile mortality; that infant mortality in the first month of life is preventable, as also the high rate in crowded centers of population. In his subsequent reports (1913–16), Newsholme shows that more than half of infant mortality is due to infection from without, that the large maternal and infant mortality from puerperal hemorrhage, convulsions, and septicemia are due to bad midwifery; that the causes of infant mortality are many, *e.g.*, maternal ignorance, lack of medical attendance and nursing, the fecklessness of mothers, poverty, intemperance, overcrowding in areas or in rooms, defective sanitation, industrial employment of married women, large families, infectious and diarrheal diseases; and that the devices of infant welfare activity should be varied, *viz.*, proper housing, intra- and extra-domiciliary sanitation, sufficient and proper food, notification of births, medical attention and nursing and pre-maternity work, including care, feeding and instruction of the mother. The dictum of Sir George Newman† that infant mortality is less connected with external conditions than with ignorance of the mother is obviously one-sided. Infant mortality is of multiplex causation and must therefore be met by multiplex infant welfare activities. "Infant mortality," says Newsholme, "is the most sensitive index we possess of social welfare and of sanitary administration, especially under urban sanitary conditions." This sentence is the keynote of the infant welfare movement, for, as Holt says, many whom the fanatical evolutionists would regard as the physically unfit are really "victims of a bad environment, improper feeding and neglect." A high infant mortality means "the sacrifice of the *unfortunate* rather than the *unfit*," who must be eliminated "by birth, not by death."

The present infant welfare movement implies the widest extension of the activities of social medicine, from puericulture or ante-natal

* Great Britain. Local Government Board. Supplement to the 39th annual report, containing a report by the Medical Officer on infant and child mortality. London (1910), pp. 34–36; 74–78, by Sir Arthur Newsholme. Later reports: (1907–11), London (1913); Infant Mortality in Lancashire (1913); Maternal Mortality (1915); Child Mortality at Ages 0–5 (1916). See, also Report of Local Government Board on "Maternity and Child Welfare," London (1917). For a full account of infant welfare in the United Kingdom, see the histories by A. Dingwall Fordyce and T. J. Stafford in Säuglingsfürsorge und Kinderschutz (Keller and Klumker), Berlin (1912), pp. 349–440.

† Newman, Sir George, "Infant Mortality" (1906).

supervision, including pregnancy clinics, insurance of maternity, maternity homes, schools for mothers; and post-natal supervision, from day nurseries (*crèches*), milk stations, nursery schools, consultations for nurslings to school-inspections, child-study, mental tests, school-lunches (*cantines*), child-labor legislation, child-welfare activities, play centers, vocational aptitude studies, instruction inhome economics, and training for parentage.

Recent English legislation bearing on maternal and infant welfare comprises, besides the Notification of Births Acts of 1907 and 1915, the Housing of the Working Classes Acts (1885–1903), the Compulsory Infectious Diseases (Notification) Extension Act (1899), the Factory and Workshop Act (1901), the Midwives Act (1902), the Children Act (1908), for protecting wet-nursed infants beyond the Infant Life Protection Act of 1897, the Housing and Town-Planning Act (1909), the National Insurance Acts (1911, 1913), the Milk and Dairies Act (Consolidation) Act (1915), the Public Health (Venereal Diseases) Regulations (1916), the Midwives Act (1918), and other war measures. Florence Nightingale's letters of 1891–2 on health visiting in rural districts were reprinted in 1911.* Milk depots were established at St. Helens (1899), Finsbury (1914, and elsewhere. The first schools for mothercraft were started at St. Marylebone (February, 1906) as the Borough of St. Marylebone Health Society, which opened an Infant Consultation on May 10, 1906. Winchester followed in December, 1906.† The St. Pancras School for Mothers was founded in 1907 and followed by other schools at North Islington (1914), Stockport (1914) and elsewhere. In June, 1918, a long list of English welfare associations and schools for mothers was given in the massive report of the Carnegie United Kingdom Trust on the physical welfare of mothers and children by E. W. Hope of Liverpool and Miss Janet M. Campbell (Liverpool, 1917). Dr. Barnardo's homes for nurslings at Hawkshurst, the Children's Home at Sidcup, Kent, the London School for Myopes, the Downs Ringworm School at Sutton (Surrey) for children afflicted with tinea, are other phases of English activities.

The first National Conference on Infantile Mortality was held in the Caxton Hall, Westminster, on June 13–14, 1906; the second on March 23–25, 1908; the third on August 4–5, 1913, all under the presidency of John Burns. To these conferences such able medical officers of health as James Niven (Manchester), J. Spottiswoode Cameron (Leeds), G. F. M'Cleary (Hampstead), James Robert Kaye (West Riding), John F. J. Sykes (St. Pancras), E. W. Hope (Liverpool), S. G. H. Moore (Huddersfield), A. W. Chalmers (Glasgow), George Reid (Staffordshire), as also Mayor Broadbent, Sims Woodhead, J. W. Ballantyne contributed valuable papers on infant mortality. At the third conference Van Ingen, Shaw, Talbot, LaFetra and other American pediatrists took part. International congresses for the study and prevention of infant mortality, originally inspired by the French Consultations des Nourissons and the Gouttes de Lait, have been held at Paris (October 21, 1905), Brussels (September 12–16, 1907) and Berlin (September 11–15, 1911). In Canada, admirable reports on infant mortality have been made to the Registrar General of Ontario by Dr. Helen MacMurchy (1910–12).

In 1910, Dr. Janet E. Lane-Claypon, on behalf of the Lister Institute, made a journey through Germany, Sweden and Denmark, to study modes of prevention of infant mortality.‡

* Letters from Miss Florence Nightingale on Health Visiting in Rural Districts. London, P. S. King and Son (1911).

† Pritchard, E., Lancet, London, i (1917), p. 352.

‡ In a MS. kindly lent by Miss Ellen C. Babbitt. For the history of infant welfare in Germany, see, also, Arthur Keller's article in Säuglingsfürsorge und Kinderschutz (Keller and Klumker), Berlin (1912), pp. 185–311.

German activities at that time included milk kitchens, with baby consultations in most of the large towns; maternity insurance; nursing bonuses of 1.–4.8 marks to mothers who nurse their own children; a free hospital, established in Dresden by Schlossmann, for all sick, illegitimate or parentless children whose relatives could not pay for them; homes for illegitimate or other Poor Law children, to get them in good health prior to boarding out; regulations for police supervision of all children under four who are boarded out in German towns (1879), and revised regulations for the police inspection of these children in Berlin (1890); a system of *public guardianship* of illegitimates, established at Leipzig by Dr. Max Taube (1904), whereby all illegitimate children born in Leipzig become at once the wards of the municipality under his personal care; systems of *collective guardianship* of illegitimates in Strassburg, Danzig, Breslau, Mannheim, Freiburg, Berlin, Dresden, Hamburg, Halle, Kiel and other towns; a Kinder-Asyl for the reception of all Poor Law children in Berlin (1901), Breslau (1903), Hamburg (1907) and elsewhere; supervision of children in foster homes; a number of private institutions for nursing mothers; the attempt to supply wet-nurses in Dresden and Berlin; syphilitic nurses for syphilitic children; a few private institutions for nursing mothers; forest and seaside homes, sanatoria and holiday camps for sick and convalescent infants; and a Society for the Prevention of Infant Mortality which held its first meeting at Dresden (1909). There is a sick-insurance law protecting women six months before and six months after childbed; and a provision for suckling-money (*Stillgeld*) for working mothers. On June 4, 1909, the Kaiserin Auguste Victoria Haus, the headquarters of all German efforts against infant mortality, was opened in Berlin. This institution, planned under the patronage of the Empress, and designed to be (at Heubner's instance) "an institute for the physiological investigation of infant nutrition, with clinical treatment," was constructed at a cost of the $625,000, collected by public subscription. It was intended to be a model institution for scientific research on infants of all ages and in all states of health, where all phases of infant life, post-natal and ante-natal, may be found, with provision for the care of confinement cases and sick babies from all classes of society and the training of educated women as nurses. It is said that the results of this extravagant outlay did not come up to expectations. Germany is only surpassed by Russia, Austro-Hungary and Roumania in infant mortality. A guardianship office and welfare station, for prompt financial aid and care of expectant mothers and their infants, exists at Charlottenburg. There are also two leagues providing workers to take care of a home during the lying-in period. On the didactic side, effective object lessons were furnished at the Dresden Hygienic Exhibit in 1911. The different milk-kitchens, day nurseries, infant hospitals, etc., of Germany were shown on a map with colored pegs. The average gastro-enteritis mortality during 1880–1909 was shown to be inversely as the scale of living, *viz.*, zero in the wealthy, 4.8 per 1,000 in the upper middle classes, 36.1 in the lower middle classes, and 59 among the poor. The Wassermann test showed 10 per cent. of latent syphilis in wet-nurses. The exhibits included correct clothing for a baby, sanitary and unsanitary toys, unhygienic nursing bottles, models of ophthalmia neonatorum, degrees of dental development, the infant stomach and its contents, casts of infant stools, models and photographs of rachitic infants and a box of coins, showing that out of a working man's income of 1,380 marks ($395), 400 went for housing, 560 for food, 140 for clothing, 360 for amusements and 160 for alcohol.* It has been objected against the modern German care of infancy in hospitals that, in spite of the splendid organization of applied science, the movement was more or less an expression of the concern of the metallic Prussian bureaucracy about the decline in the birth rate, and that there was a certain lack of humanistic "mothering" which is deemed so essential in Anglo-Saxon countries. "You have seen all the splendid provisions for studying the proper care of babies, but have you seen the babies themselves?" was the question put by Professor Medin of Stockholm to women who were visiting the Berlin establishments. The importance attached to cradle-songs, dandling, fondling and other modes of diverting the infant

* For the above facts, I am indebted to Miss Ellen C. Babbitt.

in Hellenistic pediatry is emphasized in Sister Mary Rosaria's dissertation "The Nurse in Greek Life" (Boston, 1917). This is naturally a field in which women excel.

In Hungary, under the laws of 1901–3, every child under 15, if not otherwise provided for, is entitled to state care, food, education and a home (Van Ingen). This is managed by state asylums, each under a medical director, and 374 State Children's Colonies, or foster homes. Delicate, sickly children are kept in the asylums until they can be entrusted to the foster parents, and are afterward constantly watched by a local physician and visiting nurses. Mothers of babies in the asylums are given financial support if they nurse them, and may accompany them to the foster homes. A model lodging house fits the unassisted man to get a job by fumigating, cleaning and mending his clothes (Babbitt). Between $1,500,000 and $2,000,000 were expended for the state care of children in 1910. The total mortality of nurslings in asylums was 11.2 per 100, and 10.89 in foster homes.

In Spain, a Superior Council for Child Welfare, presided over by the Minister of the Interior, looks after all children under 10 years of age, supervises crèches, asylums, hospitals and the training of midwives and protects children in care of foster parents. As part of the administration under the Superior Council, there are 49 provincial bodies and over 6,000 local bodies which attend to details of this mode of social service.

In Holland, infant welfare is in charge of Dr. Saltet, head of the Health Department of Amsterdam and professor of hygiene in the University. The statistics show a low mortality rate, particularly among the Jewish families of Amsterdam, among whom breast nursing is the rule. Between 1895 and 1910, there was a decrease of 55.7 per cent. in the infant mortality rate. The obstetrician Treub maintains that abortion is increasing.

In Sweden, the Allmänna Barnhuset or Public Orphanage, founded about 1760, insures breast feeding for four months after birth, by allowing the mother to remain in the institution with her child. At the same time she nurses another child. This regulation once complied with, her child is adopted as a ward of the foundation for 14 years. If the mother does not comply, a sum of 600 kronor ($162) must be paid for the maintenance of the child, the mother renouncing all rights to it henceforth. Poor Law children also become wards of the Orphanage, the city of Stockholm paying 400 kronor for the maintenance of each. This applies to poor children from all parts of Sweden. Children weaned at four months are boarded out with foster parents. About 5,200 children are taken care of annually and about 850 babies in the Orphanage. The average mortality in the Orphanage was 12.16 per cent. in 1894–8 and 10.7 per cent. in 1899–1903 (Lane-Claypon).

In New Zealand, the Royal Society for the Health of Women and Children, centralized in Dunedin, with eight local branches in other parts of the dominion, and seventy subsidiary committees, has done capital work. It is sometimes called the Plunket Society, after the Governor General and his wife, Lord and Lady Plunket, who are its patrons. Its field agents are the so-called Plunket nurses, who, each of them, look after one of the districts into which the two islands are subdivided, giving instruction in all branches of the art of motherhood, even in girls' schools. There is a complete system of birth registration and close government supervision of midwives, maternity hospitals, infant asylums and nurses. The aim is essentially modern, to teach girls and women the duties and responsibilities of maternity and infant welfare. The result of these activities has been to reduce the infant mortality from 83 to 51 per 1,000 in ten years, while at Dunedin it is now 40 per 1,000 (4 per cent.), as against 150 in Berlin, 120 in Paris and New York, 100 in London. This is the best record yet obtained in a community of size. The highest infant mortality rate is that of Chile (333 per 1000).

In the United States the infant welfare movement is of comparatively recent growth, partly owing to the fact that there has been no uniform system of birth registration. New Zealand, Hungary

Germany, and Sweden have gone far to solve the problem of poverty for the people. New Zealand has solved the problem of teaching the people how to live. These are paternalistic activities carried forward in populations practically homogeneous in respect of racial and national sentiment. Our problem is one of heterogeneity of race, racial psychology, and "sectional" feeling. It is highly significant, in this regard, that many of the principal pioneers and prime movers of social service in America have been women.* Special credit is due to Philip **Van Ingen** (1875–), of New York, for his painstaking and valuable work in assembling annual comparative tables of infant mortality from the vital statistics of the health departments of states and large cities, prior to the actual publication of these reports.

Rochester, New York, was the first American city to have a Milk (Welfare) Station (1897), and now maintains ten during the summer months. Boston, Chicago, Cleveland, Philadelphia, Richmond employ visiting nurses for pre-natal work and instruction to expectant and actual mothers. In 1902, a Milk Fund Association was started in Cleveland, to supply modified milk and medical attention to infants brought to a central station. In 1904, a farm was acquired, and certified milk was thereafter distributed instead of milk modified according to a percentage formula. In 1906, the Milk Fund Association combined with the Visiting Nurse Association to form an infant clinic, and maternal instruction was then given by visiting nurses attached to the clinic. In December, 1906, this work was taken over by the Babies' Dispensary and Hospital, and in 1907, the Milk Fund Association amalgamated with and turned over all its property to the Babies' Dispensary and Hospital. Branch dispensaries (Babies' Prophylactic Dispensaries) were then formed to look after the hygiene of normal infants, while the central dispensary attended to the sick. There were six of these branch establishments in 1908, all under one medical director and one supervising nurse. In 1910, a dispensary building was erected, with a milk laboratory, lecture room, consultation rooms and other accessories. In 1911, Cleveland appropriated $10,000 for infant welfare work and established five public prophylactic dispensaries and a department of child hygiene in charge of the medical director of the Babies' Dispensary and Hospital and its supervising nurse. By combining the original branch dispensaries, the city had thirteen branch dispensaries at the end of 1911. Special nurses now look after infantile blindness, foster homes for babies, and the teaching of infant hygiene in girls' schools. Finally, the medical director of the establishment is now professor of pediatrics in Western Reserve University, and eight hours in the compulsory curriculum are devoted to practical training in infant welfare work.

Up to 1902, the Department of Health of New York City employed special physicians to look after sick babies in the tenements. In 1903, visiting nurses were also detailed to follow up these cases, and general milk inspection was begun. On August 19, the Division of Child Hygiene was established with Dr. S. Josephine **Baker** as chief, and a staff of 161 medical inspectors and 142 nurses. The functions of this division are the control and supervision of midwives, the instruction of mothers in infant hygiene, the inspection and sanitary supervision of day nurseries, the supervision of foundlings in foster homes and institutions for dependent children, the medical inspection and examination of school children and the enforcement of the child labor law in relation to employment certificates. In the summer

*Among these may be mentioned Miss Julia C. Lathrop (Washington), Dr. S. Josephine Baker (New York), Dr. Helen MacMurchy (Toronto), Miss Ellen C. Babbitt (Washington), Dr. Grace L. Meigs (Washington), Dr. Alice Hamilton (New York), Dr. Mary Sherwood, Dr. Lillian Welsh and Miss Gertrude B. Knipp (Baltimore), Mrs. William Lowell Putnam (Boston), Miss Jane Addams (Chicago).

of 1911, 79 milk stations were operated, 15 by the Health Department, 31 by the New York Milk Committee, and 33 by other organizations. An Infant Welfare Association, afterward known as the Babies' Welfare Association, was formed by the amalgamation of 150 different infant welfare associations. During 1904–10, the average infant mortality in New York was 16,527. In 1911, it fell to 15,030, in 1912, 14,289, in 1913, 13,797. The infant mortality rate fell from 280 per 1,000 in 1880 and 144 in 1908 to 102 in 1913. Outside of New York City the infant mortality rate in the state fell from 125 in 1913 to 111 in 1914. The present motto of the New York Health Department is: "Public health is purchasable; and within certain limits each community may determine its own death rate."

Work along the same lines has been done by the Committee on Infant Social Service of the Women's Municipal League of Boston (1909), the Pregnancy Clinic of the Boston Lying-In Hospital (1912), the Visiting Nurse Association of Bridgeport, Connecticut (1912), the Social Service Department of the Washington University Hospital, St. Louis (1912), the Division of Child Hygiene of the Kansas State Department of Health (1915), and similar organizations in Massachusetts, Ohio, Louisiana, Texas and other states. Public lectures, exhibitions, exhibit cars, "Little Mothers' Leagues," and "Baby Weeks" and "Better Babies" contests are varied features of infant welfare work. Nation-wide Baby Weeks were held in 1916 and 1917 under the auspices of the Children's Bureau and the General Federation of Women's Clubs, and 1918 was made a "Children's Year" for the inauguration of a rational program of child welfare in wartime. A Back-to-School drive was instituted October 17, 1918. In 1915, there were 462 infant welfare stations in different American cities. Of these, 290 are maintained by private organizations in 92 cities. In 1909, the American Association for the Study and Prevention of Infant Mortality was organized. In 1912, the United States Government established the Federal **Children's Bureau** at Washington, under the direction of Miss Julia C. **Lathrop,** a former associate of Miss Jane Addams at Hull House, Chicago. The object of this Bureau is the investigation of "all matters pertaining to the welfare of children and infant life." The Children's Bureau has made important surveys of the status of infancy and infant mortality in Johnstown, Pennsylvania, Montclair, New Jersey, and Manchester, New Hampshire. A complete life history of every baby born in a particular year in these localities has been obtained, and if the baby died within the year, the causes of death were investigated. In Johnstown, a city made up largely of East European immigrants, it was shown that there is a direct relation between bad sanitation, multiplex household drudgery and the varying mortality in the different wards. As shown at the Dresden Hygienic Exhibit, the infantile death rate is inversely as the annual income of the father. The average infantile death rate in Johnstown is 134 per 1,000, but 264 among the Serbo-Croats alone. In Montclair, a wealthy residential community, it is 84. In Manchester, an industrial town, it is 193, the principal cause being the daily occupation of the mothers in the textile mills. Among the English, Irish and Scotch, the rate is 66 per 1,000; among the French Canadians, it is 248. Artificial feeding and unduly large families explain the difference.*

By the passage of the Congressional act, effective September 1, 1917, the powers of the Children's Bureau have been enlarged by the establishment of a Child Labor Division to carry out the intent of the law. Recent American Child Welfare

* For the information conveyed in this section, I am much indebted to the articles of Ellen C. Babbitt, Tr. Am. Assoc. Study and Prev. Inf. Mortal., 1911, Baltimore, ii (1912), pp. 64–71; L. Emmet Holt, *Ibid.*, iv (1913), pp. 1–54; E. B. Phelps, Tr. Internat. Cong. Hyg. and Demog. (1912), Washington, vi (1913), pp. 132–183; Philip Van Ingen, Am. Jour. Dis. Child., Chicago, vii (1914), p. 471; x (1915), p. 212; Grace L. Meigs, *Ibid.*, xiv (1917), pp. 180–197; and to the rich supply of literature and public documents on infant welfare kindly supplied me by Miss Babbitt and Miss Gertrude B. Knipp (Baltimore). For the activities of the Children's Bureau, Washington, see Miss Lathrop's reports (I–VII, 1913–19), and the many publications of the Bureau.

acti ities culminated in the Sheppard-Towner Bill (December, 1921) by which governmental aid is extended to states for the organizing of Divisions of Child Hygiene in the State departments of health or to assist those already formed.

As a rule, the larger the family, the higher the infant death rate. Unwelcome children are not usually well cared for. Heartless parents will even allow children to die on their hands by starvation or exposure (*Engelmacherei*). This brings up the question of birth-control. As stated by Dr. Jacobi in 1915, the object of birth-control is to limit reckless and irresponsible begetting of children by deliberately regulating their number and the time of their arrival. It is maintained by the opponents of birth-control that, on the continent of Europe, where control is a commonplace right of women, the liberty has been a main coefficient in bringing about the depopulation of modern states and that, in the United States, it has the disadvantage of being connected with the sordid interests of "sexually exploited women" and of commercial drug firms. The present European war goes to show that a country with a small population may be in danger of being overwhelmed by a country with a teeming population, bred for military purposes. But, other things being equal, it cannot be denied that the general ideal of advanced modern states (at least in crowded cities) would be the moderate sized family; in other words, fewer but better children. Bernard Shaw closes with the subject in the following aphorisms:

"The essential function of marriage is the continuance of the race, as stated in the Book of Common Prayer. The accidental function of marriage is the gratification of the amoristic sentiment of mankind. The artificial sterilization of marriage makes it possible for marriage to fulfill its accidental function while neglecting its essential one. The most revolutionary invention of the XIX Century was the artificial sterilization of marriage."

These sentences reveal to what extent the religious and moral inhibitions of the past have broken down under the influence of modern philosophy. In another place, Shaw observes that:

"If we desire to maintain the population at its present figure or to increase it, we must take immediate steps to induce people of moderate means to marry earlier or to have more children. . . . The population declines because the high birth rate of the very poor is counterbalanced by a huge infantile mortality in the slums, whilst the very rich are also the very few and are becoming sterilized by the spreading revolt of the women against excessive childbearing—sometimes against any childbearing."

In spite of the advantages of early marriages—*viz.*, that they are apt to be more durable and that the early married are able to establish their children in life before they die—the depopulation of modern states continues because the conditions of modern life are such that most people are financially unable to marry early and because few modern women are physically adapted or mentally inclined to the demands of multiparity. Thus the birth rate of a nation in any period, as Havelock Ellis maintains, is regulated automatically by social and economic conditions. Lecky, in the "Map of Life," contends that the two influences which "inevitably and powerfully tend to depress the vital-

ity of a nation" are "sanitary science itself, which enables great numbers of constitutionally weak children, who in other days would have died in infancy, to grow up and marry and propagate their offspring" and "the steady movement of populations to towns." He concludes that "the great diminution in infant mortality is in truth a very doubtful blessing." But these Tory squire arguments are pulverized by the very fact that the infant welfare movement originated, in the first instance, from a general alarm about the depopulation of modern states; while statistics have proven to the hilt the theorem of Newsholme that a high infant mortality rate in a crowded modern community connotes a high general mortality and a specific lowering of vitality in that community. It was formerly supposed that the weakest went to the wall, and women, even in our own time, would say of a dead infant: "It is better off in heaven." But the causes of a high infant mortality are of a kind that really affect all infants and all adults. In the past, when there were not so many people in the world, the law of the survival of the strong and brutal obtained with full force and "coward Adam" first made definite war upon the defenseless infant. Today, he has grown a little ashamed of himself. The main issue at stake in the present European war was to determine whether overbearing power can continue to play the cowardly bully toward the weak or wreak vindictive spite upon the defenseless.

In wartime, infant welfare activities acquire an additional prospective value through the fact that as the population continues to be killed off in the warring countries, the infants who are to replace them become more and more of a national asset. In all these countries, the birth rate has been steadily decreasing of late years.

In England, the starting point of preventive, as distinguished from palliative, infant welfare work, was a memorandum of the Local Government Board, of date July 30, 1914, outlining measures for ante-natal, natal and post-natal care, including systematic maternal and child welfare activities and insurance of maternity by means of a liberal grant of money from Parliament. Hospital treatment for infants, food for expectant and nursing mothers and infants under five, crèches, day nurseries, homes for deserted and illegitimate children, etc., were further provided for in the Circular of the Local Government Board of August 9, 1918. In spite of the fact that millions of women were eventually engaged in munition and other war-industries, the infant death rate steadily declined. The passage of the Notification of Births (Extension) Act in 1915 insured compulsory notification of births in all parts of the British Isles within 36 hours after birth. In March, 1914, there were 600 health visitors for the metropolitan boroughs, and in February, 1917, there were 1,445, and 800 district nurses. In June, 1918, there were 700 centers for maternity and infant welfare work, established by local authorities, 578 by voluntary societies, 751 whole-time health visitors, 760 part-time health visitors, 1,044 district nurses engaged by local authorities and 320 additional health visitors in the employment of voluntary societies.* The infant death rate of England and Wales in 1891–1900 was 153, in 1901–10, 128, in 1911–15, 110, and in 1916, 91, the lowest then attained. The birth rate was 23 in 1914–15, 22 in 1915–16, and 20.9 in 1916–17. In Scotland, the infant death rate fell from 126 in 1915 to 97 in 1916, also the lowest on record. On July 2–7, 1917, a National Baby Week

* Newsholme, Sir A., U. S. Dept. Labor Child. Bureau, Standards of Child Welfare, Rep. Child. Bureau Conf., Washington (1919), p. 279.

exhibition was held in Central Hall, Westminster, as part of a general campaign of education. Maternity is practically insured and child welfare up to school age is forwarded. The Board of Education offers grants for mothers' schools and day nurseries, with standardized methods of procedure. Under the National Insurance Act, £650,000 were appropriated in 1914–15 to cover the deficit caused by the high sick rate among married women.*

In Paris, the *Office central d'assistance maternelle et infantile* was organized in August, 1914, to insure public care of every pregnant woman and every child under three, "to be sure that no woman is ignored and no child forgotten." The eleven maternities of the *Assistance publique* (the official agency of Parisian charity) took care of public confinements among the poor, the *Mairies* furnished obstetric assistance at home, free consultation centers for pregnancy were established everywhere, military ambulances carried women to the hospitals, *cantines maternelles* supplied meals to pregnant women, military allowances were given to the mothers of soldiers' children, a government maternity grant was established on June 13, 1913, and long debates have been held in the Academy of Medicine as to the hygiene of pregnant women working in munition factories. *La Mutualité maternelle*, with over 50 consultation centers in Paris and elsewhere, insured the payment of 12 francs a week to mothers and 10 francs if they nurse the child. Senator Paul Strauss's law of August, 1914, allocates 1 franc daily to a prospective mother for a month before the birth of her child and 1½ francs daily for four weeks after, which has increased the birth rate. In 1915–16, 95.2 per cent. of all labor cases were cared for by the *Assistance publique* (Pinard) and the birth rate in this period was little more than half of that in 1913–14. The rates of infant and maternal mortality and of still-births fell in 1914–15 and rose in 1915–16, along with the number of abandoned infants, which Pinard explains by the increased employment of women in munition and other factories. Eventually, the French infants were cared for in wards attached to the munition factories, and the working mothers were allowed to nurse them at intervals. With a deficiency of 25 to 50 per cent. of physicians in the larger cities, with 800,000 women employed in munition factories, with an infant mortality rate of 126 in 1917, and with a war birth rate 50 per cent. less than normal and at least 40 per cent. below the total death rate, it became obvious that France was facing national extinction. During the whole period of the war, the discussion of the high infant mortality and the low birth rate went on in the Academy of Medicine, Pinard taking a strong stand against the employment of women as munition workers. In July, 1917, the Children's Bureau of the American Red Cross began its activities with eleven members under the direction of William Palmer **Lucas**; by July, 1918, it had over 400 members and its activities extended over the whole area of France. In the Toul sector, J. P. Sedgwick soon installed a colony of over 500 mothers and children and established a children's hospital of 200 beds, with chains of dispensaries in the smaller towns. This idea was carried through the whole war zone under the direction of Maynard Ladd, and, in Paris, the dispensary service was established by J. A. Miller. At Évian, where a contagious diseases hospital of 200 beds was established under C. F. Gelston, over 40,000 children of *rapatriés* were examined and treated, with dispensary service. At Lyons, a dispensary, hospital and barracks for refugee children were established, and a baby-show exposition, attended by over 170,000 people, was held on April 9 and three weeks after, under the direction of C. J. Grulee and, later, of Miss Ellen C. Babbitt. In June, this exhibit was transferred to Marseilles, and extended to other cities. The *guignol*, the cinema, cartoons, posters and picture post-cards were freely used, and a special educational bureau endeavored to reach the public through pamphleteering and the press. Special supplemental lunches for school children were developed by Mason Knox and Manning.†

* See Great Britain. Local Government Board. Maternity and Child Welfare. (Circulars, regulations and memoranda.) London (1916).

† See: Lucas, W. P., Jour. Am. Med. Assoc., Chicago, lxxii (1918), pp. 359–362; Am. Jour. Dis. Child., Chicago, xvi (1918), pp. 212–219. Grulee (C. G.), Am. Jour. Dis. Child., Chicago, xvi (1918), pp. 220–225. Knox (J. M.), *Ibid.*, pp. 242–252.

In Belgium, William Palmer Lucas reported indications of a decrease in infant mortality rate in the large cities (except Mons), largely due to the canteens for feeding expectant and nursing mothers and infants under three.

In Germany, there was a falling off of over two million births during the first three years of the war, so that 40 per cent. fewer babies were born in 1916 than in 1913, as compared with the 11 per cent. fall in England; but while the infant death rate rose from 151 per 1,000 in 1913, to 164 per 1,000 in 1914, it was markedly reduced in 1915–16, and well kept down thereafter. Even in the early months of the war, it was not as high as in the dry, hot months of 1911 (192 per 1,000). In consequence of mobilization, there was a sudden interruption of infant welfare work in nearly all German towns. The doctors in charge were called to the colors for military duty, the welfare workers were taken for army nursing, and many infants' homes were turned into military hospitals. One-fourth of all the Hessian welfare centers were closed, and five out of fourteen in Cologne. Even mothers frequently neglected their infants during this exciting period. In a letter of August 12, the Kaiserin pointed out the fatal error of neglecting infant welfare work for military considerations, but its revival was due to alarm over the sudden increase in infant mortality from August, 1914. The imperial allowances for soldiers' wives and children fixed by the law of August 4, 1914 were increased over four- and two-fold during the war, the maternity benefits under the Imperial Insurance Law of 1910 were liberally extended, a Federal Order authorizing imperial grants appeared on December 3, 1914, and was extended even to the wives of men on patriotic auxiliary service on July 6, 1917. There was a special grant for women who breast-fed their babies. By 1915, there were nearly 800 infant welfare associations in 550 localities, 271 day nurseries, and 266 maternal institutions, but in some localities these were entirely lacking. The Kaiserin Auguste Victoria Haus continued to be the center of infant welfare activities. Rickets and infantile diarrhea were alarmingly prevalent in 1915–16, and some physicians observed a special kind of war infants (*Kriegsneugeborene*), not premature, but under-developed at birth, with symptoms of constant restlessness and automatic grasping movements.*

In Canada, much has been done by Baby Week campaigning and the care of dependents of enlisted men. The valuable work of Miss Helen MacMurchy in Toronto has already been mentioned. Many of the Victorian Order of Nurses went for duty overseas. Of American pediatrists, Knox, Sedgwick, Lucas, Veeder, Ladd, Grulee, Manning and others were active in infant welfare work in the war zones.

It has now been attempted to give an outline of the history of pediatrics from its earliest beginnings to the present hour. If the exigencies of military duty have not permitted as exhaustive a study as might otherwise have been undertaken, I trust that enough has at least been presented to show the tremendous growth and importance of the science in recent years. Perhaps, like the infant itself, the subject of pediatrics first began to attract the attention of physicians through its very helplessness. No less than fifteen army surgeons mentioned in these pages have done much to forward this science, and the large number of pediatrists who have taken up infant welfare work in the present war goes to show the truth of Langstein's observation that "children are to be regarded as the most valuable capital of the state." This was, in fact, the view of the earlier German publicists, Süssmilch and Peter Frank.

Our bead-roll of benefactors of child-life includes Hippocrates, the

* Infant Welfare in Germany during the War. Report prepared in the Intelligence Department of the Local Government Board, London, 1918.

founder of internal medicine and of infantile orthopedics; Soranus, who wrote the first individualized treatise on infant hygiene; Archbishop Datheus of Milan, who originated the foundling asylum; St. Vincent de Paul, the patron of friendless children, whose charitable endeavors led to the foundation of the *Hospice des enfants trouvés* (1640); George Armstrong, who founded the first dispensary for children (1769); Johann Peter Frank, the pioneer of school hygiene (1779); Count Rumford, who originated school lunches for children (1792); John Bunnell Davis, who adumbrated the modern methods of lowering the mortality of infants (1817); Morel de Villiers, Benjamin Broadbent and S. G. H. Moore, of Huddersfield, and Sir Arthur Newsholme, who made them accomplished fact; Semmelweis and Credé, who made the prevention of puerperal septicemia and infantile conjunctivitis viable; Théophile Roussel, the physician-legislator, whose beneficent laws for the protection of children have been our models; O'Dwyer, the inventor of intubation; Roux and von Behring, the discoverers of antitoxin; Grancher, the originator of isolation cubicles and of surgical cleanliness in children's wards in hospitals; Soxhlet, Rotch, Coit, Schlossmann and others who have made "clean milk" possible; the many investigators of infant nutrition and metabolism; and the great humanistic pediatrists, like Charles West, Jacobi and J. Lewis Smith, who have practised this branch of medicine, not merely as a scientific specialty, but from genuine love of the children themselves. Nor should we forget the artists, the musicians, the poets and men of letters who have added such a warm human interest to child-study.

Contrast the utterances of the past, which meted out nothing to childhood but a frown of disapproval, with the larger, more tolerant attitude of modern writers:

"It is better to keep children to their duty by a sense of honor and by kindness than by fear of punishment." Tertullian.

"Nothing has a better influence on children than praise." Sir Philip Sidney.

"I would not have children much beaten for their faults, because I would not have them think bodily pain the greater punishment." Locke.

"Children are very nice observers, and they will often perceive your slightest defects. In general, those who govern children forgive nothing in them, but everything in themselves." Fenelon.

"Dispel not the happy illusions of childhood." Goethe.

"Where on earth is there so much society as in a beloved child?" Landor.

"Children have more need of models than of critics." Joubert.

"Do not try to produce an ideal child; it would find unfitness in the world." Hebert Spencer.

"The vilest abortionist is he who attempts to mould a child's character." Bernard Shaw.

"The best brought up children are those who have seen their parents as they are. Hypocrisy is not the parent's first duty." Bernard Shaw.

"Not one book in a thousand is worth as much to mankind as an innocent little child or a Chicago ham." H. L. Mencken.

In conclusion, I wish to acknowledge the generous and valuable assistance which has been rendered me by some of the most eminent pediatrists in this country, whom I have approached in the spirit

advocated by a prominent writer on child-study: "Only the sham knows everything: the trained man understands how little the mind of any individual may grasp, and how many must coöperate in order to explain the very simplest things."* My correspondence with these gentlemen has been truly delightful and from their expressions about one another, I may (in the droll expression of Stendhal) "augur" the existence of a larger degree of fraternal feeling than exists in some other branches of medicine. Such followers of the pediatric art and science as I have known have seemed, for the most part, genial, helpful, unassuming men, men inclined to minimize their own talents, a trait rare in physicians, although the chief end of pediatrics is the maintenance of the family and the perpetuation of the human race.

* Gross, Hans.

CHAPTER II

CONGENITAL AND ACQUIRED PREDISPOSITION AND HEREDITY

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I. INTRODUCTION

The last twenty years have witnessed the birth and vigorous growth of the experimental investigation of the phenomena of inheritance. The field has proved so fertile that even those who are engaged actively in this research have found it difficult to keep track of the immense array of facts which has sprung up.

It is not surprising, therefore, that in the past geneticists have not made any considerable effort to present the more important discoveries in their science to workers in the allied sciences. Until lately they have been classifying and analyzing the data obtained by the numerous investigators in their own field. Now, however, has come the opportunity, and indeed the obligation to consider the bearing of the main discoveries in enegtics upon anthropology, agriculture, and medicine, and to visualize, even though it be imperfectly, the opportunity for coöperation and mutual gain in the bringing to the attention of investigators or practitioners in these fields the particular discoveries in genetics which should prove of immediate and permanent interest in their work.

Various factors such as slow breeding, and relatively small families have proved handicaps in the study of human genetics. Yet a notable array of facts have been obtained from investigation in this field, and these together with the results of breeding experiments with plants and lower animals have pointed to the conclusion that closer coöperation and mutual understanding between genetics and medicine is now a natural relationship which must be brought about.

The great majority of genetic discoveries have been made since 1900. Their recognition and appreciation will gradually lead to the adoption by medical men in general and by obstetricians and pediatricians in particular of a biological point of view which will aid immensely in reducing to an analyzable and predictable condition data that would otherwise remain unexplained and devoid of significance. Thus medical men must be made aware of the chief facts and discoveries resulting from genetic investigation in such subjects as sex determination, the physical basis of heredity, and the method of inheritance of normal and pathological, physical and mental traits in the lower animals and in man.

In a similar fashion geneticists will gain new inspiration and make great progress by utilizing the material which medical men can place at their disposal. The fields of comparative embryology, comparative pathology, bacteriology, physiology, psychiatry, immunology, pediatrics, and most other branches of the medical sciences are rich with problems for biologists and geneticists. The benefits which will result from coöperation between genetics and medicine are therefore mutual, important, and immediate.

To convince medical men of this, however, it will be necessary to place before them the more striking discoveries of genetics, to explain their value to medical practice and research, and to point out the ways in which medical men with a biological point of view thus established can and will provide a great body of trained observers and investigators who will continually add in an accurate and logical way to our knowledge of human heredity.

In no other way can the study of human heredity be so successfully pursued and be made of permanent value and of self perpetuating and ever increasing extent and interest.

In this chapter therefore, we shall consider in some detail the more important discoveries in the general field of experimental genetics; we shall then deal with the particular phase of human inheritance, and lastly, we shall consider the practical and utilizable value of the results already obtained.

In treating these subjects, the attitude taken may, at some points, seem to be dogmatic. In such event the reader is asked to remember that what we are striving for is a *point of view, a mental attitude*, and that therefore apparently radical statements must be taken on trust, later to be modified and limited, if necessary, by a more thorough investigation of all the points in question which is certain to follow the adoption of the viewpoint desired.

Genetics is young, vigorous, and perhaps in certain respects, over enthusiastic, but it has won its spurs and proven its worth biologically. It will moreover, provide a biological approach to many of the questions most interesting to medical men.

The pediatrician is in a peculiarly strong position in respect to the material with which he works. The child, although complicated, is not so much the product of environmental factors, as is the adult with the accumulation of years of training and artificial influences. The child is far more a product of purely biological factors and less a combination of biology and sociology, inseparably and confusingly interwoven.

This fact has been but little recognized by students of human inheritance who have expended by far the greater part of their efforts and energies in the investigation and analysis of the inheritance of adult traits. We may therefore, expect a surer and more rapid return from a study of the child, than from that of the adult, and we may hope that the pediatrician will be among the first of the medical profession to see the value of, and grasp the opportunities of a genetic point of view.

Illustrations and facts will be presented based on investigations with adult humans and with lower animals or even plants. As they are taken up, however, it should become clear that the facts of variation and inheritance have a common origin and behavior in high and low forms. Once this is perceived and recognized the data of many investigators become available to guide and to assist in outlining the genetic phases of medicine in general, and of pediatrics in particular.

If then this chapter assists the reader in obtaining a biological viewpoint and stimulates him to adopt an inquiring and coöperative attitude towards the genetic nature of his material—it will have amply justified its existence, and will have gone far towards giving inheritance its rightful place in a system of pediatrics.

II. DISTINCTION BETWEEN TRANSMISSION AND HEREDITY

One of the first points to be made clear is just what facts or categories of phenomena are to be included under our definition of heredity.

Broadly speaking, any substance or any characters developing from any substance passed by one generation to another may be considered as inherited. It is possible, however, at the outset to draw a distinction between substance actually transmitted as so much baggage by the germ cells such as the organism for syphilis on one hand, and the inherent parts of the biochemical constituents of the germ cell which are the underlying causative determinants of the truly genetic characters of the organism.

We shall therefore, consider as merely *transmitted* substances or bodies carried as passengers by the germ cell from one generation to another. Such materials do not react in any measurable or recognizable way upon the cells which carry them, but retain their distinct and characteristic form. Their presence or absence in any germ cell is due to their being placed there bodily by some definite physical process—such as infection, inoculation or through the medium of the blood stream. They are normally substances or bodies capable of independent existence outside of the germ plasm—in the form in which they are transmitted.

In this respect, they form a marked contrast with the truly hereditary factors or determinants which are an essential part of the cell organization and which are or have been up to the present time inseparable from it. These determinants appear to be highly specific in nature and in many cases complicated in structure. As will be seen, later, the analysis and prediction of genetic results on the hypothesis of the existence, the unit nature, and the definite position within the cell of such determinants have been the chief lines of progress in experimental genetics during the past twenty years.

We may then consider the behavior of a transmissable character in slightly more detail, in order to contrast it later with examples of true inheritance.

In this connection the experiments of Riddle, the Gages, and others, with the dye Sudan III are of interest. Sudan III is a dye which stains fatty tissue red. It becomes attached to fatty particles within the body and remains with them wherever they go. It follows therefore, that if and when the particles of fat pass through the follicular membranes and into the egg, they will, if they be stained with Sudan III, carry it with them and thus transfer it to the embryo. The simple and mechanical nature of this process as well as its distinction from what we ordinarily consider as inheritance has been recognized and pointed out by Riddle (1910) in the fowl as follows:

". . . While in the body, Sudan III clings at all times to the fats or their constituent fatty acids, and so goes quite mechanically wherever these particles go; it is indeed attached to them." And again:

". . . Within the ovum the Sudan III is deposited in the germinal disc and in the latebra in smaller amounts than elsewhere. This is undoubtedly to be associated with the lower fat content of these regions of the egg."

"If now one compares and contrasts these processes with those known to accompany inheritance; *i.e.*, developmental processes, some interesting features appear. There is, to be sure, *transmission* of the dye from soma to germ; there is a *persistence* of that which is transmitted to such an extent as to cause the soma obviously to display the "new character." If the body fat in the chick were used up in egg production as was elsewhere noted, some of the dye would of necessity again be deposited in the several eggs next formed; these eggs would in turn supply the somatic tissues developing from them. *But this must inevitably come to an end in a few generations;* the stain sooner or later will become diluted to the vanishing point. Again *there is absolutely no growth of the material* forming the "character," nor is there any chemical change either in early or in late phases of the life cycle."

We have then in such a case as this, the simplest type of a transmissible character which is carried into the germ cell but which remains chemically unchanged and a passive agent until so diluted by purely mechanical distribution that it does not *visibly* express its presence.

Very similar to this case is that of so-called "hereditary" syphilis. Here the syphilis organism is the actual material handed on from parent to offspring. In cases where successful transmission from parent to offspring takes place through an uninfected parent, the organism is borne as a passenger by the sex cells of the affected parent. Following its usual habit, the organism multiplies in the tissue in which it finds itself with the result that the fetus is infected. If now the fetus matures and though suffering from the disease reaches birth and grows to sexual maturity, there is, entirely outside of the chance of contact infection, an opportunity for *its* germ cells in turn to actually *transmit* the organisms to an uninfected individual and so to repeat the process above outlined.

Of course, in such cases, germ cells might, and probably would be

formed free from the syphilis organism, due to the mechanical nature of the process by which the organism is distributed through the tissues. It will be observed that there is obviously *no way of predicting what proportion if any of the germ cells of a given individual are going to carry the organism.* This is in marked contrast with true inheritance, the nature of which we shall later consider.

A moment's consideration will serve to make clear the points of similarity between these two cases. In the first place the materials transmitted retain their identity *without chemical change,* in the second place they are both transferred from soma to germ by a mechanical process, as an outside or foreign body and finally they persist and reappear *unmodified* in the somatic cells, of the next generation.

We may next consider a slightly different category of cases, namely those in which attempts have been made to modify the germ cells by external agents, either physical or chemical. Among the numerous efforts made along these lines two sets of experiments stand out clearly. The first of these is work with radium and the second is treatment with alcohol vapor.

A. Experiments with Radium.—The destructive effects of radium on living tissue as evidenced by its ability to inflict severe burns and its therapeutic value in the treatment of cancer, have long been of considerable interest to biologists. Because of its absorption by and influence on the cell and particularly the nucleus, radium has been used as a possible modifier of the germ cell.

Chief among the experimenters in this field, are the Hertwigs who have carried out an interesting series of crosses with different species of frogs and other cold-blooded, water-inhabiting animals.

The mechanical advantage of using for experimentation a form in which fertilization normally occurs outside the body after the liberation of both male and female sex cells into water, is very great. The sex cells can be easily reached for treatment, the number of eggs liberated is commonly very large and the course of development easy to observe. These factors have contributed to the success which has been obtained by the Hertwigs.

In general their results may be summarized as follows: The embryos resulting from fertilization between lightly treated sperm and a normal egg are malformed and abnormal in character. The same is true in the case of a slightly treated egg fertilized by a normal sperm. In the two cases there is little if any difference in the nature or extent of the abnormalities, provided the *dosage* of radium is the same in both.

If either the sperm or the egg is treated for a long time, and is then combined in fertilization with a normal germ cell, the result is most surprising. Instead of an increase of abnormalities and deformities the resulting embryo is small but *normal,* and its development is distinctly slow. Cytological investigations have shown that such embryos are parthenogenetic. The radiated germ cell takes no part in development beyond the actual process of fertilization and the nucleus of the

normal germ cell becomes the sole participant in the processes of cell division.

Unfortunately no cases have been reported of breeding records of the abnormal individuals and we cannot therefore determine whether and in what degree the abnormalities will be transmitted to succeeding generations. The appearance of abnormalities following light treatment strongly suggests the results obtained with alcohol vapor by Stockard with guinea pigs—but the occurrence of parthenogenesis shows a type of effect not seen in the guinea-pig experiments. Radium, because of its selective action on the nucleus is of especial interest in attempting to modify the germ plasm. Its effects are undoubted, but a regular and predictable genetic behavior following modification of the germ plasm without weakening or partially destroying its reactions are still to be obtained.

B. Experiments with Alcohol.—Pearl has carried out an extensive series of experiments to study the effect of the inhalation of alcohol vapor on the progeny of the domestic fowl. Throughout his experiments he has carefully controlled his tests by a considerable number of untreated animals. He has compared the progeny of tests and of controls in respect to prenatal and postnatal mortality, occurrence of abnormalities, weight at hatching, adult weight, rate of growth, and total number of progeny obtained. In every character except the last, the treated animals gave a better breeding record than did the controls.

Pearl interprets this as meaning that there is a selective mortality of weaker germ cells, as a result of the alcoholization, thus producing a selected surviving class which represents zygotes formed from stronger germ cells only.

In support of this he cites an interesting experiment in which a control group of artificially incubated eggs was compared with groups of artificially incubated eggs which had been subjected to fumes caused by the daily evaporation of 40 c.c. of 95 per cent ethyl alcohol for one, two, and three weeks respectively. The mortality in the egg was then observed and the chicks of all lots marked, and subjected to rather poor brooding facilities to induce a relatively high proportion of absolute mortality. The result was as follows:

	Eggs set	Per cent. infertile	Per cent. dead 30 days after hatching	Prenatal deaths in per cent. of fertile eggs
Lot 1—Alcohol one week....	130	26.2	28.3	42.7
Lot 2—Alcohol two weeks...	130	26.9	21.2	43.2
Controls.....	390	28.5	34 1	38.7
Lot 3—Alcohol three weeks.	130	32.3	37.5	60.5

It will be observed that the similarity of the four lots of eggs as regards the percentage of infertility is marked. The higher prenatal mortality of the alcoholics is also clear. When, however, we consider